SOUTHERN THORACIC SURGICAL ASSOCIATION

65th ANNUAL
MEETING & EXHIBITION

NOV 7-10

STSA 2018
AMELIA ISLAND, FL

MEETING DATES: NOVEMBER 7–10
EXHIBIT DATES: NOVEMBER 8–9

OMNI AMELIA ISLAND PLANTATION RESORT
AMELIA ISLAND, FL

SPECIAL THANKS

SPECIAL THANKS TO STSA
65TH ANNUAL MEETING CORPORATE SUPPORTERS

PLATINUM
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Florida Hospital

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Abbott

OTHER
Edwards Lifesciences

FUTURE MEETINGS

November 6-9, 2019
JW Marriott Marco Island Beach Resort
Marco Island, FL

November 4-7, 2020
Loews Royal Pacific Resort at Universal Orlando™
Orlando, FL

November 3-6, 2021
Loews Atlanta Hotel
Atlanta, GA

TABLE OF CONTENTS

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PROGRAM AT-A-GLANCE

WEDNESDAY, NOVEMBER 7, 2018

3:30 pm – 7:00 pm	**Registration** — *Magnolia Ballroom Foyer*
6:00 pm – 7:00 pm	**Postgraduate Program Welcome Reception** *Cumberland Ballroom Foyer*
7:00 pm – 9:00 pm	**Postgraduate General Session:** I Wish I Could Have Done That Case Over: Complex Case Presentations and Interactive Discussions — *Cumberland Ballroom B-C*

THURSDAY, NOVEMBER 8, 2018

6:30 am – 5:00 pm	**Registration** — *Magnolia Ballroom Foyer*
6:30 am	**Continental Breakfast** — *Magnolia Ballroom Foyer*
7:00 am – 7:50 am	**Basic Science Forum** — *Cumberland Ballroom B-C*
7:00 am – 7:50 am	**Ethics Debate:** The Devoted Grandma: Social Indication for TAVR — *Cumberland Ballroom* A
8:00 am – 10:30 am	**First Scientific Session** — *Magnolia Ballroom D-G*
10:00 am – 12:00 pm	**Exhibits Open** — *Magnolia Ballroom A-C*
10:30 am – 10:45 am	**Break & Visit Exhibits** — *Magnolia Ballroom A-C*
10:45 am – 11:20 am	**President's Invited Lecturer** — *Magnolia Ballroom D-G* Coach Lou Holtz Reflections on Leadership
11:20 am – 12:00 pm	**Presidential Address** Kevin D. Accola, MD *Reflection on a Career in Cardiothoracic Surgery: Maintaining Humanistic Values in a Changing Environment* *Magnolia Ballroom D-G*
12:00 pm	**All Attendee Lunch** — *Magnolia Garden*
1:30 pm – 2:00 pm	**Dessert Served in the Exhibit Hall** — *Magnolia Ballroom A-C*
1:30 pm – 3:30 pm	**Exhibits Open** — *Magnolia Ballroom A-C*
2:00 pm – 3:00 pm	**Second Scientific Session** — *Magnolia Ballroom D-G*
3:00 pm – 3:30 pm	**Break & Visit Exhibits** — *Magnolia Ballroom A-C* *Video abstract presentation in the Exhibit Hall*
3:30 pm – 5:30 pm	**Third Scientific Session** — *Magnolia Ballroom D-G*
5:30 pm – 6:30 pm	**2018 Cardiothoracic Surgery Jeopardy Competition for North America** Rounds 1 & 2 — *Magnolia Ballroom D-G*
6:00 pm – 7:00 pm	**Residents Reception** — *Sunrise Terrace*
7:00 pm – 9:00 pm	**President's Mixer** — *Magnolia Garden*

FRIDAY, NOVEMBER 9, 2018

6:30 am – 4:45 pm	**Registration** — *Magnolia Ballroom Foyer*
6:30 am	**Continental Breakfast** — *Magnolia Ballroom Foyer*
7:00 am – 8:30 am	**Fourth Scientific Session A – Simultaneous Subspecialty Breakout Sessions** Adult Cardiac Breakout — *Magnolia Ballroom D-G* Thoracic Breakout — *Cumberland Ballroom A* Congenital Breakout — *Cumberland Ballroom B-C*
7:45 am – 12:00 pm	**Exhibits Open** — *Magnolia Ballroom A-C*
8:30 am – 9:00 am	**Break & Visit Exhibits** — *Magnolia Ballroom A-C* *Video abstract presentation in the Exhibit Hall*

9:00 am – 10:00 am	**Fourth Scientific Session B – Simultaneous Subspecialty Breakout Sessions** Adult Cardiac Breakout — *Magnolia Ballroom D-G* Thoracic Breakout — *Cumberland Ballroom A* Congenital Breakout — *Cumberland Ballroom B-C*
10:00 am – 10:30 am	**Break & Visit Exhibits** — *Magnolia Ballroom A-C* *Video abstract presentation in the Exhibit Hall*
10:30 am – 10:50 am	**Kent Trinkle Education Lectureship Panel** *Magnolia Ballroom D-G* New Paradigms in Residency Education: Insights on Current Challenges and Surgical Training John H. Calhoon, MD and John A. Kern, MD
10:50 am – 11:00 am	**Break & Visit Exhibits** – *Magnolia Ballroom A-C*
11:00 am – 12:00 pm	**Fourth Scientific Session C – Simultaneous Subspecialty Breakout Sessions** Adult Cardiac Breakout — *Magnolia Ballroom D-G* Thoracic Breakout — *Cumberland Ballroom A* Congenital Breakout — *Cumberland Ballroom B-C* Surgical Transcatheter Interventions Breakout — *Ossabaw A*
12:00 pm	**Grab n' Go Lunch** *A variety of sandwiches, wraps and salads, along with sides and beverages, will be available for purchase in the Magnolia Ballroom Foyer. Should you wish to venture out and explore the property, several Omni restaurants are open for lunch. Resort maps, restaurant hours and descriptions, are available at Registration, and shuttles will make frequent trips as needed.* **Early Practitioners Luncheon** — *Ossabaw B*
12:45 pm – 3:30 pm	**Exhibits Open** — *Magnolia Ballroom A-C*
1:00 pm – 1:30 pm	**Break & Visit Exhibits** — *Magnolia Ballroom A-C*
1:30 pm – 2:15 pm	**Managing the New Anticoagulants: Surgical Perspectives and Strategies** Jerrold H. Levy, MD — *Magnolia Ballroom D-G*
2:15 pm – 2:45 pm	**Harold Urschel History Lectureship** Pouya Hemmati, MD One Hundred and Counting: Dr. Dwight C. McGoon's Enduring Legacy — *Magnolia Ballroom D-G*
2:45 pm – 3:30 pm	**Break & Visit Exhibits** — *Magnolia Ballroom A-C* *Video abstract presentation in the Exhibit Hall*
3:30 pm – 4:30 pm	**Fifth Scientific Session** — *Magnolia Ballroom D-G*
4:30 pm – 5:15 pm	**STSA Annual Business Meeting** STSA Members Only — *Magnolia Ballroom D-G*
5:15 pm – 5:45 pm	**2018 Cardiothoracic Surgery Jeopardy Competition for North America** Final Round — *Magnolia Ballroom D-G*
7:00 pm – 10:00 pm	**Dinner Gala** — *Magnolia Ballroom D-G*

SATURDAY, NOVEMBER 10, 2018

7:00 am – 10:00 am	**Registration** — *Magnolia Ballroom Foyer*
7:00 am	**Postgraduate Program Breakfast Buffet** *Magnolia Ballroom Foyer*
8:00 am – 10:00 am	**Postgraduate General Session: The Past, Present and Future** — *Magnolia Ballroom D-G*
10:00 am	**Program Adjourns**

SCHEDULE OF ACTIVITIES

WEDNESDAY, NOVEMBER 7

Postgraduate Program Welcome Reception—*Cumberland Ballroom Foyer*
Time: 6:00 pm – 7:00 pm

Join fellow STSA meeting attendees for a casual welcome reception to kick off the first STSA Postgraduate Program General Session. An informal dinner featuring wings, pizza, and refreshments will be held in the foyer outside of the session room.

THURSDAY, NOVEMBER 8

Spouse/Guest Hospitality Suite—*Oceanview*
Time: 8:30 am – 11:00 am
STSA is providing a complimentary hospitality room for spouses and guests to mingle and make plans for exploring Amelia Island.

All Attendee Luncheon—*Magnolia Garden*
Time: 12:00 pm (Followed by dessert in the Exhibit Hall)
Cost: Complimentary

Residents Reception—*Sunrise Terrace*
Time: 6:00 pm – 7:00 pm
Residents, fellows, and medical students attending the meeting are invited to join STSA leaders for this hour-long networking event. Spouses and guests are welcome.

President's Mixer—*Magnolia Garden*
Time: 7:00 pm – 9:00 pm
Cost: Complimentary
Attendees receive two tickets with registration. Additional tickets may be purchased for $25.00. Visit the registration desk for details.

Gather with fellow meeting attendees for an evening of networking and fun.

FRIDAY, NOVEMBER 9

Spouse/Guest Hospitality Suite—*Oceanview*
Time: 8:30 am – 11:30 am
STSA is providing a complimentary hospitality room for spouses and guests to mingle and make plans for exploring Amelia Island.

Dinner Gala
Reception: 7:00 pm - 7:30 pm—*Magnolia Ballroom Foyer*
Dinner: 7:30 pm - 10:00 pm—*Magnolia Ballroom D-G*
Cost: $125.00 per adult / $40.00 per child (ages 12 and younger)
Join fellow meeting attendees and their families for the always memorable Dinner Gala, complete with a cocktail reception, dinner, awards and music entertainment. A band has been added to this year's program and will provide easy listening through the dinner hour. Don't miss it! Although black tie is always in fashion, you are welcome to wear cocktail attire. Be comfortable and have fun!

SATURDAY, NOVEMBER 10

Spouse/Guest Hospitality Suite —*Oceanview*
Time: 8:30 am – 10:00 am
STSA is providing a complimentary hospitality room for spouses and guests to mingle and make plans for exploring Amelia Island.

Postgraduate Program Breakfast Buffet—*Magnolia Ballroom Foyer*
Time: 7:00 am – 8:00 am

STSA is providing a light breakfast buffet sponsored by Florida Hospital for all attendees, spouses, and guests prior to the start of the second Postgraduate Program General Session. With a theme of "The Past, Present and Future," Dr. Wayne Sotile will discuss the topic of physician resilience. Dr. Sotile is a pioneer in the fields of health psychology, resilience and work/life balance for high performing individuals. Spouses and guests are encouraged to attend this special presentation.

ONSITE FITNESS & RECREATION

INDIVIDUAL GOLF PLAY

Cost: $108.00 (Price includes greens fees, golf cart and practice balls.)

The Oak Marsh Golf Course is one of the truly classic Pete Dye-designed golf courses in the world. The course, built in 1972 shortly after the completion of the Harbour Town Golf Links at Hilton Head Island, South Carolina, is noted for its tight fairways and small greens, meandering along serpentine salt marsh creeks and through the moss draped heritage oaks for which Amelia Island is famous.

At par 72, this 6,500-yard course has 14 holes with water hazards and numerous bulk-headed greens. A variety of bunkers are placed throughout the course to add to the challenge, and a natural approach has been maintained as well with the use of coquina shell cart paths, native plant life and preserved habitats for the local wildlife.

Contact the golf shop at (904) 491-4801 to reserve a tee time according to your schedule. Be sure to mention you're an STSA attendee to receive the group discount. Rental clubs are available for $65 and include one sleeve of golf balls. Rental items are not included in the cost of individual golf play.

Please note the following dress code: Men must wear collared shirts with long pants or Bermuda length shorts. Ladies must have a collar or sleeves on their top. Dresses, shorts or skirts of appropriate length are allowed. Only soft-spiked shoes are allowed on the course.

RESORT EXCURSIONS AND LOCAL ACTIVITIES

The Omni Amelia Island Plantation Resort features a long list of exciting and rejuvenating on-property activities. On arrival, guests will be provided with a Resort Guide outlining the week's activity schedule, as well as available excursions and dining options. The resort is situated directly on the beach, and offers two swimming pools, a splash park, full service spa, two fitness centers including state-of-the-art Racquet Park Health Club, a championship golf course, and world-renowned tennis facilities. Spend your free time exploring the surrounding maritime forests on rented bicycles or Segways, stroll through the Shops of Amelia Island Plantation and pick up souvenirs, or reserve a private cabana on the beach for you and your family. Visit www.omnihotels.com/hotels/amelia-island-plantation or contact the Concierge team at (904) 432-1467 for more information.

CAMP AMELIA

Cost: Daytime: $75 plus tax per child | Evening: $65 plus tax per child (meals are included)

Camp Amelia gives guests from ages 4–10 the chance to explore the resort and discover nature, science, salt life, and much more! Interactive learning excursions are offered with full-day themed sessions available. Campers will construct a unique craft and create lifelong memories with an award-winning recreation department. Participants must be fully toilet trained. Pre-registration is required. Camp Amelia is conveniently located adjacent to the pool deck. Please call (904) 432-1451 for more information and reservations, or visit the hotel website for additional details. Camp Amelia is open daily from 9:00 am - 2:00 pm. Evening camp hours are available on Friday and Saturday, 6:00 pm - 9:30 pm. Evening hours may be extended until 10:30 pm for an additional fee of $20 per child. This service is limited, please make reservations in advance. Pre-registration is required at least 24 hours in advance.

CHILDCARE SERVICES

The Omni Amelia Island Plantation Resort recommends the following childcare provider:

Amelia Island Nanny
(904) 742-3481
www.ameliaislandnanny.com

DISCUSSION OF PAPERS

Each session has a limited amount of time reserved for discussion. Please review the program outline carefully to determine if you have a particular interest in some of the topics, then be prepared to discuss them at the meeting. If you wish, you may request a copy of the manuscript in advance of the meeting by contacting the author directly.

PRESENTATION AND PUBLICATION

Authors of oral presentations are required to submit a manuscript for consideration for publication in *The Annals of Thoracic Surgery* before noon on Saturday, November 10, 2018. Manuscripts must be submitted via *The Annals* online manuscript submission system at www.editorialmanager.com/annals/default.aspx. A paper copy of the manuscript will not be accepted for consideration. Primary authors and co-authors that are delinquent in submitting their manuscript to *The Annals* on time will not have abstracts considered by the Program Committee of the STSA for two (2) subsequent meetings.

ACCREDITATION STATEMENT

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of The Society of Thoracic Surgeons and The Southern Thoracic Surgical Association. The Society of Thoracic Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

DESIGNATION STATEMENT

The Society of Thoracic Surgeons designates this live activity for a maximum of 17.50 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

STSA CME MISSION

The continuing medical education mission of the Southern Thoracic Surgical Association is to design and deliver high-quality, practical, innovative, and scientifically rigorous educational programming at its Annual Meeting in the areas of cardiovascular, thoracic, and congenital heart surgery, as well as ethics and professionalism, leadership, and practice management.

Such educational programming is meant to advance the overall competence of cardiovascular, thoracic, and congenital heart surgeons, and ultimately to help them improve their patient outcomes and promote patient safety.

Continuing medical education activities are presented in a variety of formats at an STSA Annual Meeting; these include [but are not limited to] presentations of peer-reviewed scientific abstracts, updates on relevant scientific research, didactic presentations, debates, video presentations, and sub-specialty-specific break-out sessions. All educational sessions include the opportunity for questions, answers and discussion to further support the educational needs of the meeting attendees and the program learning objectives.

STSA educational activities are developed and provided with the intent of confirming an existing knowledge base, imparting new knowledge, enhancing competence in the content areas covered, and addressing identified professional practice gaps. The expected results include participants' reporting greater confidence in their clinical care skills and a willingness to change their behavior or adapt new strategies as appropriate.

ELECTRONIC CME EVALUATION

The STSA 65th Annual Meeting evaluation and CME credit claim process is electronic. Registrants who wish to receive CME credit for sessions they attend will be required to complete the electronic evaluation for the session. This is the only way physicians can earn CME credit for their attendance. Using the electronic evaluation system, registrants can complete the meeting evaluation, claim CME credit, and print CME certificates. Certificates of Attendance are also available for non-physician attendees.

The electronic evaluation provides attendees the opportunity to offer feedback to the STSA Council and Program Committee regarding content offered, including information about applicability of the content to current practice, quality of the material presented, and recommendations for future programming. This information is invaluable in the planning of future STSA educational programs.

In addition to being useful for program planning, program evaluation and future needs assessment are important components of the requirements that the STS must meet to maintain accreditation through the Accreditation Council for Continuing Medical Education (ACCME). It is by meeting the requirements set forth by the ACCME that the STS is able to award CME credit for educational programming.

The electronic evaluation can be completed by meeting registrants onsite at computer kiosks located in the **Magnolia Ballroom Foyer**.

Attendees can also access evaluations by visiting the online evaluation website through personal computers or handheld devices at **https://www.xcdsystem.com/stsa**. In order to make this process more convenient for attendees, the meeting evaluations will be available online through Friday, December 7, 2018.

Attendees can log in to the evaluation website with the following information:

Username: E-mail Address (note, your username is the e-mail address that you used to register for the Annual Meeting)

Password: STSA2018! (Type STSA in all caps)

This process will allow STSA to maintain an electronic record of CME earned by physicians. Files will be maintained for a minimum of six years. Any questions regarding this procedure should be directed to STSA Headquarters at (312) 202-5892 or via e-mail at stsa@stsa.org.

STSA POLICY REGARDING DISCLOSURE

The Southern Thoracic Surgical Association will seek thorough financial and commercial disclosure information, according to ACCME requirements and recommendations, from all presenters, discussants, and moderators participating in an STSA Annual Meeting. Failure or refusal to provide disclosure information automatically disqualifies participation. All disclosure information will be communicated to the learners through appropriate means, including but not limited to the Annual Meeting Program Book.

STSA leadership, planning committee members, and staff will also provide disclosure information to be kept on file and communicated to meeting attendees through the STSA Annual Meeting Program Book.

All abstracts and disclosure statements will be reviewed approximately three (3) months prior to the Annual Meeting by staff for unidentified conflicts of interest. Any such potential conflicts will be brought to the attention of the STSA President, Council Chair, and CME Committee Chair for review and resolution. Any potential conflicts of interest must be resolved before presentation. If a conflict is deemed unresolvable, the paper cannot be presented at the Annual Meeting.

NOTE: To avoid confusion with regard to the question of "relevance," STSA requires that anyone in a position to control content (planners, speakers, authors, volunteer leaders, staff) must review the content they are addressing and disclose relationships with companies that have a material interest in the content being covered regardless of the division of the company for which that relationship exists. For instance, if a speaker will be referencing a product made by the X division of ABC company, but his relationship is with the Y division, he must still disclose the relationship.

Authors and meeting faculty listed with a ***D*** next to their names within the Schedule of Events on page 14 have indicated, in accordance with the ACCME Standards and the STS Disclosure Policy, that they have a financial or other relationship with a healthcare-related business or other entity to disclose; or their paper's content describes the use of a device, product or drug, that is not FDA approved, or the off-label use of an approved device, product or drug. Unless otherwise noted in this Program Book or by the speakers, speakers have no commercial relationships to disclose and will be presenting information only on devices, products, or drugs that are FDA approved for the purposes they are discussing.

Please refer to the Relationship Disclosure Index on page 246 for a listing of all disclosure information pertaining to Program Planners, 2018 STSA Officers, Council and Committee Members, Abstract Reviewers and STSA Staff.

THE SOCIETY OF THORACIC SURGEONS EDUCATION DISCLOSURE POLICY

As a sponsor of continuing medical education accredited by the Accreditation Council for Continuing Medical Education (ACCME), The Society of Thoracic Surgeons requires that any individual who is in a position to control the content of an educational activity must disclose all relationships with commercial interests (including known relationships of his or her immediate family, department, and partners). The ACCME defines a commercial interest as "any entity producing, marketing, reselling, or distributing health care goods or services consumed by, or used on, patients. The ACCME does not consider providers of clinical service directly to patients to be commercial interests." The question of whether a disclosed conflict situation could represent undue influence on the educational activity by a commercial interest or whether the disclosed information is sufficient to consider an abstract, presentation, or other educational enduring material to represent potentially biased information must be resolved prior to an individual's involvement in STS educational programming.

Required disclosures include (1) a financial interest of any amount (e.g., through ownership of stock, stock options, or bonds) (2) the receipt of any amount of cash, goods or services within the current 12-month period (e.g., through research grants, employment, consulting fees, royalties, travel, or gifts) or (3) a nonremunerative position of influence (e.g., as officer, director, trustee or public spokesperson). EXCLUDED from this disclosure requirement are blind trusts or other passive investments such as mutual funds. In the case of a financial or other relationship disclosure, the company, product/service, and specific nature of the relationship must be noted. Disclosure is mandatory for any person involved in the planning, management, presentation, and/or evaluation of STS educational activities.

Failure to disclose all relationships with commercial interests disqualifies the individual from being a planning committee member, a teacher, or an author of educational materials, and this individual cannot have any responsibility for the development, management, presentation, or evaluation of STS educational activities. This requirement is intended neither to imply any impropriety of such relationships nor to prejudice any individual planner, presenter or author. It is merely to identify such relationships through full disclosure, and to allow STS to assess and resolve potential influences on the educational activity prior to the planning and implementation of an educational activity. If no relationships with commercial interests exist, the individual must indicate this on the disclosure form.

Additionally, the fact that the presentation, paper, or other educational product describes (a) the use of a device, product, or drug that is not FDA approved or (b) an off-label use of an approved device, product, or drug must also be disclosed. This requirement has been adopted in response to FDA policy and case law involving medical societies, and is not intended to prohibit or inhibit independent presentation or discussion regarding the uses of devices, products, and drugs as described in (a) or (b) above.

For live presentations, all disclosures must be stated orally and on a slide at the beginning of the presentation and will be noted in published material related to the activity. Slides, handouts, and other materials utilized as part of an educational activity cannot contain any advertising, trade names or a product group message. Speakers are required to disclose that they have nothing to disclose if this is the case.

Amended by the STS Executive Committee: April 11, 2012

OVERALL MEETING OBJECTIVES

To present recent advances in research, surgical techniques, patient management, and the diagnosis and treatment of cardiothoracic disease to cardiothoracic specialists and related health care professionals; and to provide a forum for cardiothoracic surgeons and related healthcare professionals to exchange ideas through open discussion periods and question-and-answer sessions related to the practice of cardiothoracic surgery.

After attending the STSA Annual Meeting, participants should have a broader understanding of new and standard techniques and current research specifically related to adult cardiac surgery, thoracic surgery, congenital heart surgery, and related transplant procedures. Attendees can utilize knowledge gained from the STSA Annual Meeting to help select appropriate surgical procedures and interventions and integrate state of the art knowledge into their own practices.

TARGET AUDIENCE

The STSA Annual Meeting is intended for all professionals involved in delivery of cardiothoracic care with particular emphasis on cardiothoracic surgeons. Cardiothoracic residents, fellows, nurse practitioners, research scientists, and other health care professionals may also benefit from various sessions and interactions with cardiothoracic colleagues.

SPEAKER READY ROOM

The Speaker Ready Room is located in **Conference Room 2**. Speakers are requested to go to this room upon arrival, or at least four hours prior to the opening of their session to upload slides. Speakers will not be allowed to bring their laptop to the podium. **NOTE: Slides should be prepared in a 16:9 presentation format.**

SCHEDULE OF EVENTS*

*Schedule of Events is subject to change. Refer to the STSA 65th Annual Meeting mobile application for the most current information.

POSTGRADUATE PROGRAM

WEDNESDAY, NOVEMBER 7, 2018

6:00 pm – 7:00 pm
Postgraduate Program Welcome Reception
Cumberland Ballroom Foyer

7:00 pm – 9:00 pm
Postgraduate Program General Session
Cumberland Ballroom B-C

CME Credits Available: 2.0

The first portion of the Postgraduate Program will be held on Wednesday evening, which will showcase complex case presentations and interactive discussions from STSA experts; reflecting on "I Wish I Could Have Done That Case Over." Featured speakers and presentation topics will include the following:

I Wish I Could Have Done That Case Over: Complex Case Presentations and Interactive Discussions

Moderators: *Kirk R. Kanter and ***D****Daniel L. Miller
Commercial Relationships: *Daniel L. Miller: Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic

Educational Objectives: Upon completion of this program participants will be able to:

- Discuss diagnostic modalities that can be used for detection of Endocarditis;
- Explain the management of a patient who is diagnosed with Endocarditis;
- Discuss the techniques that can be used for repair and treatment strategies of Endocarditis;
- Recall the specific indications for which type of repair is warranted for a successful treatment of Endocarditis based on location, timing, underlying pathology, and co-morbidities;
- Describe valve options and techniques that are available for management of complicated Endocarditis;
- Summarize long-term outcomes as well as complications after repair and treatment of the patient with Endocarditis;
- Discuss diagnostic modalities that can be used for detection of an esophageal perforation;
- Explain the management of a patient who is diagnosed with an esophageal perforation;
- Discuss the techniques that can be used for repair of an esophageal perforation – open repair, minimally invasively, and endoscopically;
- List the specific indications for which type of repair is warranted for a successful repair of an esophageal perforation based on location, timing, underlying pathology, and co-morbidities;
- Develop a pathway to learn and implement advanced esophageal endoscopic procedures (stent placement and anchoring procedures) for repair of an esophageal perforation;
- Describe new techniques and technologies that are being used for management of esophageal perforations;
- Understand long-term outcomes as well as complications after repair of an esophageal perforation;
- Demonstrate the process of how to initiate a thoracoscopic (VATS) and/or robotic (RATS) lung resection program;
- Compare and contrast the advantages of VATS vs RATS lung resections;
- Compare and contrast the disadvantages of VATS vs RATS lung resections;
- Employ the technical methods to decrease intraoperative complications;
- Apply intraoperative techniques to correct intraoperative complications;
- Discuss the indication for VATS vs RATS lung resection;
- Explain the intraoperative and postoperative pain management issues and solutions for minimally invasive lung resections;
- Recall the postoperative complications that are unique to either VATS or RATS approach;
- Compare and contrast the cost of VATS vs RATS lung resection procedures;
- Demonstrate the minimally invasive approach which is best for you and your patients depending on your institution's resources;

- Learn how you can start a VATS or RATS lung resection program or improve your current program;
- Discuss diagnostic modalities that can be used for detection of potential complications or complexities of TAVR procedure;* Explain the management of a patient who undergoes a complicated TAVR procedure;* Discuss the techniques that can be used to avoid complications during a TAVR procedure;* Identify the specific indications for proceeding with open conventional AVR when faced with a TAVR complication;* Describe new techniques and technologies that may facilitate treatment strategies when faced with TAVR complications;*Explain long-term outcomes as well as complications after a TAVR procedure when alternative approaches are necessary to resolve complicating factors encountered during a routine TAVR procedure

7:00 pm - 7:30 pm
Adult Cardiac: Complicated Endocarditis: Timing, Approaches and Creative Techniques
*Bradley G. Leshnower[1], *Tomas D. Martin[2]
[1]Emory University, Atlanta, GA
[2]University of Florida, Gainesville, FL

7:30 pm - 8:00 pm
Thoracic: Management of Esophageal Perforation: Stent or Primary Repair?
D*Richard K. Freeman[1], ***D****Allan Pickens[2]
[1]St. Vincent's Health and Hospital System, Indianapolis, IN
[2]Emory University Hospital Midtown, Atlanta, GA
Commercial Relationships: *A. Pickens: Speakers Bureau/Honoraria: Ethicon
Regulatory Disclosure: *R.K. Freeman: This presentation describes the off-label use of an FDA approved esophageal stent for the treatment of an acute esophageal perforation.

8:00 pm - 8:30 pm
Thoracic: Complex Lung Resections: Does Approach Matter?
(Video-assisted thoracic surgery [VATS] and robot-assisted thoracic surgery [RATS])
D*M. Blair Marshall[1], *Daniela Molena[2]
[1]MedStar Georgetown University Hospital, Washington, DC
[2]Memorial Sloan Kettering Cancer Center, New York, NY
Commercial Relationships: *M.B. Marshall: Consultant/Advisory Board: Ethicon, Medtronic

8:30 pm - 9:00 pm
TAVR: Sometimes the Simple Becomes Complicated...Lessons Learned and Pitfalls to Avoid
D*Vinod H. Thourani[1], *Michael J. Reardon[2]
[1]MedStar Heart Institute/ Washington Hospital Center, Washington, DC
[2]Methodist DeBaket Heart & Vascular Center, Houston, TX
Commercial Relationships: *V.H. Thourani: Consultant/Advisory Board: Abbott Vascular, Boston Scientific, Claret Medical, Cryolife, Edwards Lifesciences, Gore Vascular, Jena Valve

ETHICS DEBATE

THURSDAY, NOVEMBER 8, 2018

7:00 am - 7:50 am
Cumberland Ballroom A

Educational Objectives: Upon completion of this program participants should be able to:

- Analyze the ethical factors concerning modification of selection criteria for the use of TAVR based on the severity of comorbidities and the emotional or social factors that mitigate the criteria.
- Apply ethical analysis to difficult decisions in the use of TAVR.
- Determine the appropriate use of TAVR to optimize benefit for each patient.

CME Credits Available: .75

7:00 am - 7:05 am
Case Introduction: The Devoted Grandma: Social Indication for TAVR
Moderator: *Robert M. Sade, *Medical University of South Carolina, Charleston, SC*

7:05 am - 7:15 am
Pro: *Andrea J. Carpenter
University of Texas Health Science Center, San Antonio, TX

7:15 am - 7:25 am
Con: William M. Novick
University of Tennessee, Collierville, TN

7:25 am - 7:30 am
Pro Rebuttal: *Andrea J. Carpenter
University of Texas Health Science Center, San Antonio, TX

7:30 am - 7:35 am
Con Rebuttal: William M. Novick
University of Tennessee, Collierville, TN

7:35 am - 7:50 am
Discussion

BASIC SCIENCE FORUM

THURSDAY, NOVEMBER 8, 2018

7:00 am - 7:50 am
Cumberland Ballroom B-C

(Presentations are limited to five minutes, followed by one minute of discussion from a selected discussant and an additional two minutes of discussion open to the audience. Papers listed without a discussant, do not have one assigned. All discussion time will remain open to the audience.)

Presenting authors are listed in bold.

CME Credits Available: .75

Moderator: *David R. Jones and ***D****Scott A. LeMaire
Resident Moderator: Valentino Bianco
Commercial Relationships: *S.A. LeMaire: Consultant/Advisory Board: Biom'up; Other Research Support: CytoSorbents, W.L. Gore & Associates, Terumo Aortic

7:00 am - 7:08 am (page 50)
1B. A 40-Year Analysis of NIH-Funded Cardiac Transplantation Research: Surgeons Lead the Way

Adishesh K. Narahari**, *James H. Mehaffey, Anirudha S. Chandrabhatla, Pranav K. Baderdinni, Allison Weiderhold, *Robert B. Hawkins, Mark Roeser, *Irving Kron, *Leora Yarboro, ***D*Gorav Ailawadi, Nicholas R. Teman
University of Virginia, Charlottesville, VA
Commercial Relationships: *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

Discussant: *Todd K. Rosengart, *Baylor College of Medicine, Houston, TX*

7:08 am - 7:16 am (page 52)
2B. VA ECMO Exacerbates LV Distension and Promotes Lung Edema While a LVAD Unloads LV in Severe Cardiogenic Shock: A Numerical Simulation Study

Po-Lin Hsu[1], Yuxin Zhu[1], Dongfang Wang[2], Cherry Ballard-Croft[2], Michael Sekela[2], ***Joseph B. Zwischenberger***[2]
[1]Soochow University, Suzhou, China; [2]University of Kentucky, Lexington, KY

Discussant: ***D***Michael Z. Tong, *Cleveland Clinic, Cleveland, OH*
Commercial Relationships: M.Z. Tong: Consultant/Advisory Board: Abbott, ABIOMED

7:16 am - 7:24 am (page 54)
3B. High Inflammatory Markers in Peripheral Blood are Associated With Recurrence in Patients With pT1 Non-Small Cell Lung Cancer Undergoing Surgical Resection

Anita Sulibhavi[1], **Sainath Asokan**[1], Jesse Schacht[1], Benedict Daly[2], Hiran C. Fernando[3], *Virginia R. Litle[2], Kei Suzuki[2]
[1]Boston University School of Medicine, Boston, MA; [2]Boston Medical Center, Boston, MA; [3]Inova Fairfax Hospital, Fairfax, VA

Discussant: *Matthew J. Bott, *Memorial Sloan Kettering Cancer Center, New York, NY*

7:24 am - 7:32 am (page 56)
4B. 3D Printed Cardiac Patch Augments Angiogenesis and Reduces Scar Tissue Formation in Vivo

Enoch Yeung, Fukunishi Takuma, Yang Bai, Djahida Bedja, Isaree Pitaktong, Gunnar Mattson, Cecillia Lui, Chin Siang Ong, Hiroshi Matsushita, Taka Inoue, Narutoshi Hibino
Johns Hopkins University, Baltimore, MD

Discussant: *Joseph W. Turek, *Duke University Medical Center, Durham, NC*

7:32 am - 7:40 am (page 58)
5B. FDG-PET SUVm Does Not Correlate With Glucose Metabolism in Non-Small Cell Lung Cancer

Kemp H. Kernstine**, Brandon Faubert, Christopher Hensley, Ling Cai, Jose Torrealba, Dwight Oliver, Robert E. Lenkinski, Craig R. Malloy, ***DRalph J. Deberardinis
UT Southwestern Medical Center, Dallas, TX
Commercial Relationships: Consultant/Advisory Board: Agios Pharmaceuticals

Discussant: *Joseph B. Zwischenberger, *University of Kentucky, Lexington, KY*

7:40 am - 7:48 am (page 60)
6B. Cardiac Biomarkers sST-2 and NT-proBNP Predict Long-Term Survival After Cardiac Surgery

Niveditta Ramkumar[1], *Jeffrey P. Jacobs[2], Richard B. Berman[1], Devin M. Parker[1], Todd MacKenzie[1], ***D***Donald S. Likosky[3], Anthony DiScipio[4], Jeremiah Brown[1]
[1]The Dartmouth Institute for Health Policy and Clinical Practice, Lebanon, NH; [2]Johns Hopkins All Children's Hospital, St. Petersburg, FL; [3]University of Michigan, Ann Arbor, MI; [4]Dartmouth-Hitchcock Medical Center, Lebanon, NH
Commercial Relationships: D.S. Likosky: Research Grant: AHRQ, NIH; Consultant/Advisory Board: AmSECT

7:50 am - 8:00 am
Break
Magnolia Ballroom Foyer

FIRST SCIENTIFIC SESSION

THURSDAY, NOVEMBER 8, 2018

8:00 am - 10:30 am
Magnolia Ballroom D-G

(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience. Papers listed without a discussant, do not have one assigned. All discussion time will remain open to the audience.)

Presenting authors are listed in bold.

CME Credits Available: 2.5

Moderators: *D**Kevin D. Accola and ***D****Daniel L. Miller
Commercial Relationships: *K.D. Accola: Speakers Bureau/Honoraria: Edwards Lifesciences; *D.L. Miller: Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic

8:00 am - 8:15 am (page 62)
1. Procedural Volume Does Not Correlate With Publically Reported Outcomes in Adult Cardiac Operations

Valentino Bianco, Edgar Aranda-Michel, Ibrahim Sultan, ***D***Thomas G. Gleason, *Danny Chu, Forozan Navid, Arman Kilic
University of Pittsburgh Medical Center, Pittsburgh, PA
Commercial Relationships: T.G. Gleason: Consultant/Advisory Board: Abbott, Boston Scientific; Research Grant: Medtronic; Other Research Support: CytoSorbents

Discussant: *D*Alan M. Speir, *Fairfax Hospital, Falls Church, VA*
Commercial Relationships: *A.M. Speir: Consultant/Advisory Board: Medtronic

8:15 am - 8:30 am (page 64)
2V. Unicuspid Aortic Valve Repair Using Geometric Ring Annuloplasty

D**John V. Conte**[2], S. Michael Roberts[2], ***D*J.S. Rankin[1], *Vinay Badhwar[1]
[1]West Virginia University, Morgantown, WV; [2]Penn State University, Hershey, PA
Commercial Relationships: *J.V. Conte: Consultant/Advisory Board: Medtronic; *J.S. Rankin: Consultant/Advisory Board: BioStable Science and Engineering Inc., AtriCure

8:30 am - 8:45 am (page 66)
3. Minimally Invasive Esophagectomy is Associated With Superior Long-Term Survival Compared to Open Esophagectomy in a Propensity Matched Analysis of the National Cancer Database

***Mickey Ising**, Jaimin R. Trivedi, Robert C. Martin, Prejesh Philips, Victor van Berkel, Matthew Fox
University of Louisville, Louisville, KY

Discussant: *Mara B. Antonoff, *MD Anderson Cancer Center, Houston, TX*

8:45 am - 9:00 am (page 68)
4. Impact of Microbiological Organism Type on Surgically Managed Endocarditis

Judson B. Williams[1,2], *Asad A. Shah[3], *Babatunde A. Yerokun[2], *Peter K. Smith[2], ***D****James S. Gammie[4], *Jeffrey G. Gaca[2]
[1]WakeMed Health and Hospitals, Raleigh, NC; [2]Duke University, Durham, NC; [3]Raney Zusman Medical Group, Hoag Hospital, Newport Beach, CA; [4]University of Maryland School of Medicine, Baltimore, MD
Commercial Relationships: *J.S. Gammie: Consultant/Advisory Board: Edwards Lifesciences

Discussant: *Faisal G. Bakaeen, *Cleveland Clinic, Cleveland, OH*

9:00 am - 9:15 am (page 70)
5. The Importance of Noncardiac Congenital Disease: Refining The Society of Thoracic Surgeons (STS) Congenital Heart Surgery Database (CHSD) Mortality Risk Model With Enhanced Adjustment for Chromosomal Abnormalities, Syndromes, and Noncardiac Congenital Anatomic Abnormalities

Jeffrey P. Jacobs**[1,2], Sean M. O'Brien[3], Kevin Hill[3], *Erle H. Austin[4,5], *J. W. Gaynor[6], *Peter J. Gruber[7], Richard A. Jonas[8], Sara Pasquali[9], Christian Pizarro[10], *James D. St. Louis[11], Leo Brothers[3], Liqi Feng[3], James Meza[3,12], Dylan Thibault[3], David M. Shahian[13], ***D*John E. Mayer[13], Marshall L. Jacobs[1,2]
[1]Johns Hopkins University School of Medicine, Baltimore, MD; [2]Johns Hopkins All Children's Hospital, St. Petersburg, Tampa, and Orlando, FL; [3]Duke Clinical Research Institute, Duke University, Durham, NC; [4]University of Louisville, Louisville, KY; [5]Norton Children's Hospital, Louisville, KY; [6]The Children's Hospital of Philadelphia, Philadelphia, PA; [7]University of Southern California, Los Angeles, CA; [8]Children's National Health System, Washington, DC; [9]University of Michigan, Ann Arbor, MI; [10]Alfred I. duPont Hospital for Children, Wilmington, DE; [11]University of Missouri-Kansas City School of Medicine, Kansas City, MO; [12]The Hospital for Sick Children, Toronto, Ontario, Canada; [13]Harvard University, Boston, MA
Commercial Relationships: *J.E. Mayer: Consultant/Advisory Board: American Board of Thoracic Surgery; Ownership Interest: Eli Lilly & Co., Johnson & Johnson, Merck & Co.; Speakers Bureau/Honoraria: Medtronic, Tenet Health

Discussant: *Robert Jaquiss, *UT Southwestern Medical Center, Dallas, TX*

9:15 am - 9:30 am (page 72)
6. Outcomes of Repair of Kommerell Diverticulum

Anirudh Vinnakota, Jay Idrees, Brad F. Rosinski, Gosta B. Pettersson, Eric E. Roselli, Andrew M. Vekstein, *Robert Stewart, *Siva Raja, Lars G. Svensson
Cleveland Clinic, Cleveland, OH

Discussant: ***D****Joseph S. Coselli, *Baylor College of Medicine, Houston, TX*
Commercial Relationships: *J.S. Coselli: Consultant/Advisory Board: Medtronic, Vascutek Terumo (Royalties Coselli Branched Graft), W.L. Gore & Associates; Research Grant: Abbott, Bolton Medical, Edwards Lifesciences, Medtronic, Vascutek Terumo, W.L. Gore & Associates; Other Research Support: Vascutek Terumo

9:30 am - 9:45 am (page 74)
7. The Efficacy of Re-Resection is Superior to Non-Surgery for Recurrence/ Second Primary Lung Cancer After Initial Curative Treatment

Haitao Zhou, Xiaozheng Kang, Liang Dai, Wanpu Yan, **Ke-Neng Chen**
Peking University Cancer Hospital, Beijing, China

Discussant: *Elizabeth A. David, *University of Southern California, Los Angeles, CA*

9:45 am - 10:00 am (page 76)
8. Cardiac Surgery Trainees as "Skin-to-Skin" Operating Surgeons: Midterm Outcomes

Jordan P. Bloom, Elbert E. Heng, Hugh G. Auchincloss, Serguei Melnitchouk, Mauricio Villavicencio, David D'Alessandro, *Thoralf Sundt, George Tolis
Massachusetts General Hospital, Boston, MA

FIRST SCIENTIFIC SESSION

10:00 am - 10:15 am (page 78)
9. Progress in Heart Transplantation for Pediatric and Congenital Cardiac Disease: A Comparison of Two Eras Over 22 Years and 179 Transplants at a Single Institution

***Jeffrey P. Jacobs**[1,3], Genevieve C. Tuite[1,2], Alfred Asante-Korang[1,3], Sharon R. Ghazarian[1], Bethany Wisotzkey[1], Shawn M. Shah[1,4], Gary Stapleton[1], Jamie Decker[1], Carrie Herbert[1,3], Vyas Kartha[1], Plato Alexander[1], Jennifer Carapellucci[1], *Diane Krasnopero[1], Jade Hanson[1], Neil Goldenberg[1,3], Nhue L. Do[1,3], *Constantine Mavroudis[1,3], Tom R. Karl[1,3], *James A. Quintessenza[5]
[1]Johns Hopkins All Children's Hospital, St. Petersburg, FL; [2]University of Notre Dame, Notre Dame, IN; [3]Johns Hopkins University, Baltimore, MD; [4]University of Virginia, Charlottesville, VA; [5]University of Kentucky, Lexington, KY

Discussant: *Kirk R. Kanter, *Emory University School of Medicine, Atlanta, GA*

10:15 am - 10:30 am (page 80)
10. Improved Mortality Associated With the Use of Extracorporeal Membrane Oxygenation as a Bridge to Lung Transplantation

Alison L. Halpern, Patrick Kohtz, Laura Helmkamp, Mohamed Eldeiry, Maggie M. Hodges, ***D***John D. Mitchell, *Muhammad Aftab, ***D***Jay Pal, ***D***Joseph C. Cleveland, *Thomas B. Reece, Robert Meguid, *David A. Fullerton, Michael J. Weyant
University of Colorado Denver, Aurora, CO
Commercial Relationships: J.D. Mitchell: Consultant/Advisory Board: Medtronic; *J. Pal: Research Grant: Medtronic; J.C. Cleveland: Research Grant: Abbott

Discussant: Sudish Murthy, *Cleveland Clinic, Cleveland, OH*

10:00 am -12:00 pm
EXHIBITS OPEN
Magnolia Ballroom A-C

10:30 am -10:45 am
Break – Visit Exhibits
Magnolia Ballroom A-C

GENERAL SESSION

10:45 am – 12:00 pm
Magnolia Ballroom D-G

CME Credits Available: 1.25

Moderators: *D**Kevin D. Accola and Richard K. Freeman
Commercial Relationships: *K.D. Accola: Speakers Bureau/Honoraria: Edwards Lifesciences

10:45 am - 11:20 am
President's Invited Lecturer: Reflections on Leadership
Coach Lou Holtz
Orlando, FL

11:20 am – 12:00 pm
Presidential Address: Reflection on a Career in Cardiothoracic Surgery: Maintaining Humanistic Values in a Changing Environment
D*Kevin D. Accola
Cardiovascular Surgeons PA, Orlando, FL
Commercial Relationships: *K.D. Accola: Speakers Bureau/Honoraria: Edwards Lifesciences

12:00 pm
All Attendee Luncheon
Magnolia Garden

1:30 pm – 3:30 pm
EXHIBITS OPEN

1:30 pm – 2:00 pm
Dessert Served in the Exhibit Hall
Magnolia Ballroom A-C

SECOND SCIENTIFIC SESSION

2:00 pm – 3:00 pm
Magnolia Ballroom D-G

(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience. Papers listed without a discussant, do not have one assigned. All discussion time will remain open to the audience.)

Presenting authors are listed in bold.

CME Credits Available: 1.0
Moderators: *Faisal G. Bakaeen and *Elizabeth A. David

2:00 pm - 2:15 pm (page 82)
11. 30 Day Surgical Readmission Risk Score in a Statewide Database: Validation of a New Multivariate Risk Model

Scott D. Barnett[1], *Eric L. Sarin[1], *Andy Kiser[5], ***D***Gorav Ailawadi[2], *Robert B. Hawkins[2], Zachary M. Tyerman[2], Jeffrey B. Rich[3], Mohammed Quader[4], ***D***Alan M. Speir[1]
[1]Inova Heart and Vascular Institute, Falls Church, VA; [2]University of Virginia, Charlottesville, VA; [3]VCSQI, Newport News, VA; [4]Virginia Commonwealth University, Richmond, VA; [5]East Carolina Heart Institute, Greenville, NC
Commercial Relationships: *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic; *A.M. Speir: Consultant/ Advisory Board: Medtronic

Discussant: *Richard L. Prager, *University of Michigan, Ann Arbor, MI*

2:15 pm - 2:30 pm (page 84)
12. Surveillance Patterns After Treatment of Non-Small Cell Lung Cancer With Lobectomy and Stereotactic Body Radiotherapy

Kyle G. Mitchell, David Nelson, *Wayne L. Hofstetter, *Reza J. Mehran, ***D***Jack A. Roth, *Boris Sepesi, *Stephen G. Swisher, *Ara Vaporciyan, *Garrett L. Walsh, *David C. Rice, *Mara B. Antonoff
University of Texas, MD Anderson Cancer Center, Houston, TX
Commercial Relationships: J.A. Roth: Research Grant: Varian

Discussant: ***D***Shanda H. Blackmon, *Mayo Clinic, Rochester, MN*
Commercial Relationships: *S.H. Blackmon: Ownership Interest: Boston Scientific; Research Grant: Medtronic, truFreeze; Speakers Bureau/Honoraria: Ethicon, Medtronic, Olympus

2:30 pm - 2:45 pm (page 86)
13. Norwood Palliation in High Risk Neonates With Hypoplastic Left Heart Syndrome

***Vincent K. Tam**, Lisa Roten, Eldad Erez, Vinod Sebastian, Hisashi Nikaidoh, *Phil Burch, James Kuo
Cook Children's Medical Center, Fort Worth, TX

Discussant: *Jorge D. Salazar, *Children's Hermann Memorial, Houston, TX*

2:45 pm - 3:00 pm (page 88)
14V. Rheumatic Double Valve Repair Using Two Remodeling Annuloplasty Rings

Richard S. Downey**[2], ***DJ.S. Rankin[1], Lawrence M. Wei[1], *Vinay Badhwar[1]
[1]West Virginia University, Morgantown, WV; [2]University of Michigan, Muskegon, MI
Commercial Relationships: *J.S. Rankin: Consultant/Advisory Board: BioStable Science and Engineering Inc., AtriCure

Discussant: *Tomas D. Martin, *University of Florida, Gainesville, FL*

3:00 pm -3:30 pm
Break – Visit Exhibits
Magnolia Ballroom A-C

*3:10 pm -3:23 pm (page 90)
Video Abstract Presentation in Exhibit Hall
Magnolia Ballroom A-C

Break-V1. VATS Resection for Extralobar Pulmonary Sequestration With a Large Aberrant Artery After Endoluminal Stenting and Plug Occlusion

Gopal Singh, Bianca Bromberger, Richard Green, ***Joshua R. Sonett**
New York Presbyterian/ Columbia University, New York, NY

Discussant: *Garrett L. Walsh, *University of Texas, MD Anderson Cancer Center, Houston, TX*

Video abstract presentations in the Exhibit Hall will begin approximately ten minutes after the scheduled break time has begun to allow for attendees to transition from the general session rooms into the Exhibit Hall. Actual presentation start times may vary. Each presentation is allotted eight minutes followed by another five minutes of discussion.

THIRD SCIENTIFIC SESSION

3:30 pm – 5:30 pm
Magnolia Ballroom D-G

(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience. Papers listed without a discussant, do not have one assigned. All discussion time will remain open to the audience.)

Presenting authors are listed in bold.

CME Credits Available: 2.0
Moderators: ***D****M. Blair Marshall and ***D****Vinod H. Thourani
Commercial Relationships: *M.B. Marshall: Consultant/Advisory Board: Ethicon, Medtronic; *V.H. Thourani: Consultant/Advisory Board: Abbott Vascular, Boston Scientific, Claret Medical, Cryolife, Edwards Lifesciences, Gore Vascular, Jena Valve

3:30 pm - 3:45 pm (page 92)
15. Acute Type A Dissection Repair: The Role of Individual Surgeon Experience Versus High Volume Center

D*Tom C. Nguyen, **Juan B. Umana-Pizano**, Charles C. Miller, *Hazim J. Safi, Andrei Loghin, Steven B. Eisenberg, Harleen K. Sandhu, ***D****Anthony L. Estrera
University of Texas Health Science Center at Houston, Houston, TX
Commercial Relationships: *T.C. Nguyen: Speakers Bureau/Honoraria: Abbott, Edwards Lifesciences, LivaNova; *A.L. Estrera: Consultant/Advisory Board: Gore

3:45 pm - 4:00 pm (page 94)
16. Surgical Risk Functional Outcomes and Long Term Survival After Lung Volume Reduction Surgery: A 13 Year 119 Patient Single Center Experience

Gopal Singh, Patricia Jellen, Maureen Carrol, Daniel Lambert, John Vandenberge, ***D****Byron Thomashow, *Joshua R. Sonett, **Mark Ginsburg**
New York Presbyterian/ Columbia University, New York, NY
Commercial Relationships: B. Thomashow: Consultant/Advisory Board: Boehringer Ingelheim, GSK

Discussant: *Stephen R. Hazelrigg, *Southern Illinois University, Springfield, IL*

4:00 pm - 4:15 pm (page 96)
17. Readmission Following Pediatric Cardiothoracic Surgery: An Analysis of The Society of Thoracic Surgeons Congenital Heart Surgery Database

***Brian Kogon**[1], Matthew E. Oster[6], Amelia Wallace[2], Karen Chiswell[2], Kevin Hill[2], Morgan L. Cox[2], *Jeffrey P. Jacobs[3], Sara Pasquali[4], Tara Karamlou[5], Marshall L. Jacobs[3]
[1]University of Mississippi Medical Center, Jackson, MS; [2]Duke University, Durham, NC; [3]Johns Hopkins University School of Medicine, Baltimore, MD; [4]University of Michigan, Ann Arbor, MI; [5]Cleveland Clinic, Cleveland, OH; [6]Children's Healthcare of Atlanta/ Emory University, Atlanta, GA

4:15 pm - 4:30 pm (page 98)
18. Current Outcomes With Isolated Surgical Mitral Valve Replacement: A Benchmark for Transcatheter Mitral Valve Replacement Technologies

William Z. Chancellor[1], *James H. Mehaffey[1], *Sarah A. Schubert[1], *Robert B. Hawkins[1], Jared P. Beller[1], Jeffrey B. Rich[4], ***D****Alan M. Speir[3], Mohammed Quader[2], *Leora Yarboro[1], ***D****Gorav Ailawadi[1]
[1]University of Virginia, Charlottesville, VA; [2]Virginia Commonwealth University, Richmond, VA; [3]Inova Fairfax Hospital, Falls Church, VA; [4]VCSQI, Richmond, VA
Commercial Relationships: *A.M. Speir: Consultant/Advisory Board: Medtronic; *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

Discussant: *Steven F. Bolling, *University of Michigan Hospital, Ann Arbor, MI*

4:30 pm - 4:45 pm (page 100)
19. A Minimally Invasive Approach to Lobectomy After Induction Therapy Does Not Compromise Survival: A National Analysis

Chi-fu Jeffrey Yang[2], Nicholas R. Mayne[1], Adaora P. Nwosu[1], Vignesh Raman[1], *Thomas A. D'Amico[1], *Mark Berry[2]
[1]Duke University Medical Center, Durham, NC; [2]Stanford University, Stanford, CA

Discussant: *Stephen C. Yang, *Johns Hopkins Hospital, Baltimore, MD*

4:45 pm - 5:00 pm (page 102)
20. Vascular Rings in Adults: Outcome of Surgical Management

Nishant Saran, *Sameh Said, *Joseph Dearani, Benish Fatima, Thomas Bower, *Hartzell Schaff, Alberto Pochettino
Mayo Clinic, Rochester, MN

Discussant: *Constantine Mavroudis, *Florida Hospital for Children, Orlando, FL*

5:00 pm - 5:15 pm (page 104)
21. CT-Guided Percutaneous Radiotracer Localization and Resection of Indistinct or Small Pulmonary Lesions

Domenico Galetta, Lorenzo Spaggiari
European Institute of Oncology, Milan, Italy

Discussant: *David R. Jones, *Memorial Sloan Kettering Cancer Center, New York, NY*

5:15 pm - 5:30 pm (page 106)
22. Recent Antiplatelet Therapy Does Not Affect Short Term Outcomes Following Non-CABG Cardiac Surgery

Cecillia Lui, Xun Zhou, Alejandro Suarez-Pierre, *Charles D. Fraser, *Kenton J. Zehr, Chun (Dan) W. Choi, *Ahmet Kilic
Johns Hopkins Hospital, Baltimore, MD

Discussant: Mario F.L. Gaudino, *Weill Cornell Medicine, New York, NY*

2018 Cardiothoracic Surgery Jeopardy Competition for North America
Rounds 1 & 2
5:30 pm – 6:30 pm
Magnolia Ballroom D-G

6:00 pm – 7:00 pm
Residents Reception
Sunrise Terrace

7:00 pm – 9:00 pm
President's Mixer
Magnolia Garden

FOURTH SCIENTIFIC SESSION A

FRIDAY, NOVEMBER 9, 2018

7:45 am – 12:00 pm
EXHIBITS OPEN
Magnolia Ballroom A-C

7:00 am - 8:30 am
Simultaneous Adult Cardiac, Thoracic, and Congenital Breakout Sessions

CME Credits Available: 1.5
Attendees select to participate in one of the following three breakout sessions:

ADULT CARDIAC BREAKOUT

Magnolia Ballroom D-G

(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience. Papers listed without a discussant, do not have one assigned. All discussion time will remain open to the audience)

Presenting authors are listed in bold.

Moderators: *Andrea J. Carpenter and ***D****Scott A. LeMaire
Resident Moderator: Jordan P. Bloom
Commercial Relationships: *S.A. LeMaire: Consultant/Advisory Board: Biom'up; Other Research Support: CytoSorbents, W.L. Gore & Associates, Terumo Aortic

7:00 am - 7:15 am (page 108)
23. Does Mitral Valve Repair Restore Normal Life Expectancy?

Tessa Watt[1], Shannon Murray[1], Alexander Wisniewski[2], David A. Burn[3], *Steven Bolling[1]
[1]University of Michigan, Ann Arbor, MI; [2]University of Toledo, Toledo, OH; [3]Quinnipiac University, Hamden, CT

Discussant: *D**W. Randolph Chitwood, Jr., *Vidant Medical Center and East Carolina University, Greenville, NC*
Commercial Relationships: *W.R. Chitwood, Jr.: Consultant/Advisory Board: NeoChord, Inc., Scanlan International

7:15 am - 7:30 am (page 110)
24. Clinical Outcomes of Surgical Unroofing of Myocardial Bridging in Symptomatic Patients

Pouya Hemmati, *Hartzell Schaff, *Joseph Dearani, Richard Daly, Brian D. Lahr, Amir Lerman
Mayo Clinic, Rochester, MN

7:30 am - 7:45 am (page 112)
25. Rate of Aortic Annular Enlargement Increasing in the Current TAVR Era

Robert B. Hawkins**[1], Jared P. Beller[1], *James H. Mehaffey[1], Eric J. Charles[1], Mohammed Quader[3], *Andy Kiser[2], Mark Joseph[4], *Jeffrey B. Rich[5], ***D*Alan M. Speir[6], ***D****Gorav Ailawadi[1]
[1]University of Virginia, Charlottesville, VA; [2]East Carolina Heart Institute, Greenville, NC; [3]Virginia Commonwealth University, Richmond, VA; [4]Carilion Cardiothoracic Surgery, Roanoke, VA; [5]Virginia Cardiac Services Quality Initiative, Richmond, VA; [6]INOVA Heart and Vascular Institute, Falls Church, VA
Commercial Relationships: *A.M. Speir: Consultant/Advisory Board: Medtronic; *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

Discussant: *Michael J. Reardon, *Methodist DeBaket Heart & Vascular Center, Houston, TX*

7:45 am - 8:00 am (page 114)
26. Microplegia is a Safe, Effective, and Economical Alternative to Modified Buckberg Cardioplegia for Complex Cardiac Operations: A Propensity Matched Study

Robert Borden, Clifford Ball, Pat Grady, Andrew Toth, Cheryl Lober, *Faisal G. Bakaeen, ***D***Michael Z. Tong, Eugene Blackstone, Eric E. Roselli
Cleveland Clinic, Cleveland, OH
Commercial Relationships: M.Z. Tong: Consultant/Advisory Board: Abbott, ABIOMED

Discussant: *Robert A. Guyton, *Emory University, Atlanta, GA*

8:00 am - 8:15 am (page 116)
27. Less-Invasive Aortic Valve Replacement: Trends and Outcomes from The Society of Thoracic Surgeons Adult Cardiac Surgery Database

Mehrdad Ghoreishi[1], Raveendra Morchi[2], Malek Massad[3], Morgan L. Cox[4], Samarth Durgam[3], Maria Grau-Sepulveda[4], Aditya Mantha[2], Chetan Pasrija[1], Luis Vargas[4], Alessio Pigazzi[2],* Bartley P. Griffith[1], *Jeffrey P. Jacobs[5], ***D****Vinod H. Thourani[8], *Vinay Badhwar[9], ***D****James S. Gammie[1], Lars G. Svensson[7], Khaled Abdelhady[3], Jeffrey C. Milliken[2], Zachary Kon[6]
[1]University of Maryland School of Medicine, Baltimore, MD; [2]Division of Cardiac Surgery, UC Irvine Medical Center, Irvine, CA; [3]Division of Cardiac Surgery, University of Illinois, Chicago, Chicago, IL; [4]Duke University Medical Center, Durham, NC; [5]Johns Hopkins Heart and Vascular Institute, Baltimore, MD; [6]NYU-Langone Medical Center, New York, NY; [7]Division of Cardiac Surgery, Cleveland Clinic, Cleveland, OH; [8]Medstar Heart Institute/ Washington Hospital Center, Washington, DC; [9]West Virginia University Heart and Vascular Institute, Morgantown, WV
Commercial Relationships: *V.H. Thourani: Consultant/Advisory Board: Abbott Vascular, Boston Scientific, Claret Medical, Cryolife, Edwards Lifesciences, Gore Vascular, Jena Valve; *J.S. Gammie: Consultant/Advisory Board: Edwards Lifesciences

8:15 am - 8:30 am (page 118)
28V. Apical Myectomy for Nonobstructive Hypertrophic Cardiomyopathy

Anita Nguyen, *Hartzell Schaff
Mayo Clinic, Rochester, MN

Discussant: Nicholas Smedira, *Cleveland Clinic, Cleveland, OH*

FOURTH SCIENTIFIC SESSION A

THORACIC BREAKOUT

Cumberland Ballroom A

(Presentations are limited to seven minutes, followed by eight minutes of discussion open to the audience.)

Presenting authors are listed in bold.

Moderators: *Traves D. Crabtree and *Daniela Molena

7:00 am - 7:15 am (page 120)
29. Robotic-Assisted First Rib Resection: A Single Center Experience With a Novel Surgical Approach

Stevan S. Pupovac[1], Paul Lee[1], Richard Lazarro[2], David Zeltsman[1], Julissa Jurado[1], Kevin Hyman[1], Vijay Singh[1]
[1]Northwell Health, Astoria, NY; [2]Lenox Hill Hospital, New York, NY

7:15 am - 7:30 am (page 122)
30. Impact of Positive Margins and Adjuvant Radiation on Survival After Resection of Tracheal Adenoid Cystic Carcinoma

Chi-fu Jeffrey Yang[2], Shivani Shah[2], Divya Ramakrishnan[1], *Thomas A. D'Amico[2], *Mark Berry[1]
[1]Stanford University, Stanford, CA; [2]Duke University Medical Center, Durham, NC

7:30 am - 7:45 am (page 124)
31. Dehydrated Human Amnion/Chorion Membrane (Placenta) Reduces Anastomotic Leaks After Esophagectomy

***D**Daniel L. Miller**[1], Kevin T. Watkins[2], *Gerald A. Helms[1], *William R. Mayfield[1]
[1]WellStar Health System, Marietta, GA; [2]CTCA, Newnan, GA
Commercial Relationships: *D.L. Miller: Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic

7:45 am - 8:00 am (page 126)
32. Proficiency of Robotic Lobectomy Based on Prior Surgical Technique in The Society of Thoracic Surgeons General Thoracic Database

Andrew F. Feczko[1], Hongwei Wang[2], Katherine Nishimura[2], Alexander S. Farivar[3], Adam J. Bograd[3], Eric Vallières[3], Ralph W. Aye[3], ***D***Brian E. Louie[3]
[1]Swedish Medical Center, Seattle, WA; [2]Cancer Research and Biostatistics, Seattle, WA; [3]Swedish Cancer Institute, Seattle, WA
Commercial Relationships: B.E. Louie: Research Grant: Intuitive Surgical

8:00 am - 8:15 am (page 128)
33. Technique and Outcomes of Implementing Endobronchial and Intravenous Indocyanine Green for Segmentectomy

Travis C. Geraci, ***D****Robert J. Cerfolio
New York University, New York, NY
Commercial Relationships: *R.J. Cerfolio: Consultant/Advisory Board: AstraZeneca, ConMed, Covidien LP, C-SATS, Ethicon, Google/Johnson & Johnson, Intuitive Surgical, Medtronic, Myriad, ROLO-7, TransEnterix

8:15 am - 8:30 am (page 130)
34V. Robotic Assisted Retrosternal Thyroidectomy

Ray K. Chihara, Jessica Liu, Snehal G. Patel, ***D****Manu Sancheti
Emory University, Atlanta, GA
Commercial Relationships: *M. Sancheti: Consultant/Advisory Board: Intuitive Surgical; Speakers Bureau/Honoraria: Intuitive Surgical

CONGENITAL BREAKOUT

Cumberland Ballroom B-C

(Presentations are limited to seven minutes, followed by eight minutes of discussion open to the audience.)

Presenting authors are listed in bold.

Moderators: *Harold M. Burkhart and *John H. Calhoon

7:00 am - 7:15 am (page 132)
35. Impact of SVR Trial on Single Ventricle Outcomes in HLHS at an Institutional Level Extends Beyond Use of Sano

W. Hampton Gray, Michael E. Bowdish, Wendy Mack, Winfield J. Wells, Vaughn A. Starnes, Ram Kumar Subramanyan
University of Southern California, Los Angeles, CA

Discussant: *E. Dean McKenzie, *Children's Healthcare of Atlanta Egleston, Atlanta, GA*

7:15 am - 7:30 am (page 134)
36. Post-Norwood Outcomes Improved With Pulmonary Circulation Interventions

Lillian Kang, Nicholas C. DuPont, Jacob Miller, Melanie P. Subramanian, Vipul Sharma, *Pirooz Eghtesady
Washington University in St. Louis School of Medicine, St. Louis, MO

Discussant: *Lauren C. Kane, *Arnold Palmer Hospital of Children, University of Central Florida*

7:30 am - 7:45 am (page 136)
37. Outcomes in Management of Neonatal Distal Aortic Arch Hypoplasia With Coarctation

***Joshua M. Rosenblum**, Scott Gillespie, *Kirk R. Kanter
Emory University, Atlanta, GA

Discussant: *Kristine J. Guleserian, Nicklaus Children's Hospital, Miami, FL

7:45 am - 8:00 am (page 138)
38V. Challenging Case: VSD Device Removal

***Brian Kogon**, Craig Mathis
University of Mississippi Medical Center, Jackson, MS

Discussant: *Carl L. Backer, *Ann & Robert H. Lurie Children's Hospital, Chicago, IL*

8:00 am - 8:15 am (page 140)
39. Mitral Valve Replacement in Infants Using a 15-mm Mechanical Valve

***Carl L. Backer,** Osama Eltayeb, William J. Readdy, Michael C. Mongé, *Joseph M. Forbess, Anne E. Sarwark
Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL

Discussant: *Damien J. LaPar, *Columbia University, New York, NY*

FOURTH SCIENTIFIC SESSION A

8:15 am - 8:30 am (page 142)
40. Mitral Valvuloplasty and Mitral Valve Replacement in Infants Less Than One Year Old

Tracy R. Geoffrion[1], *Timothy J. Pirolli[1], Jessica Pruszynski[1], Adrian K. Dyer[1], *Ryan R. Davies[1], *Joseph M. Forbess[2], *Kristine J. Guleserian[3]
[1]University of Texas Southwestern Medical Center, Dallas, TX; [2]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL; [3]Nicklaus Children's Hospital, Miami, FL

Discussant: *Jennifer S. Nelson, Nemours Children's Hospital, Orlando, FL

8:30 am - 9:00 am
Break – Visit Exhibits
Magnolia Ballroom A-C

*8:40 am – 8:53 am (page 144)
Video Abstract Presentation in Exhibit Hall
Magnolia Ballroom A-C

Break-V2. Early Migration of a Self-expanding Transcatheter Aortic Valve Prosthesis Causing Coronary Occlusion: A Practical Technique for Surgical Explantation
Jordan P. Bloom, Michael Kwon, George Tolis
Massachusetts General Hospital, Boston, MA

Discussant: *Ross M. Reul, *Houston Methodist Hospital, Houston, TX*

Video abstract presentations in the Exhibit Hall will begin approximately ten minutes after the scheduled break time has begun to allow for attendees to transition from the general session rooms into the Exhibit Hall. Actual presentation start times may vary. Each presentation is allotted eight minutes followed by another five minutes of discussion.

FOURTH SCIENTIFIC SESSION B

9:00 am - 10:00 am
Simultaneous Adult Cardiac, Thoracic, and Congenital Breakout Sessions

CME Credits Available: 1.0
Attendees select to participate in one of the following three breakout sessions:

ADULT CARDIAC BREAKOUT

Magnolia Ballroom D-G

(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience. Papers listed without a discussant, do not have one assigned. All discussion time will remain open to the audience.)

Presenting authors are listed in bold.

Moderators: ***D****Joseph S. Coselli and *Himanshu J. Patel
Resident Moderator: Robert Borden
Commercial Relationships: *J.S. Coselli: Consultant/Advisory Board: Medtronic, Vascutek Terumo (Royalties Coselli Branched Graft), W.L. Gore & Associates; Research Grant: Abbott, Bolton Medical, Edwards Lifesciences, Medtronic, Vascutek Terumo, W.L. Gore & Associates; Other Research Support: Vascutek Terumo

9:00 am - 9:15 am (page 146)
41. Outcomes After Acute Type A Aortic Dissection in Patients With Prior Cardiac Surgery

Elizabeth D. Krebs[4], *James H. Mehaffey[4], *Robert B. Hawkins[4], Jared P. Beller[4], Clifford Fonner[1], *Andy Kiser[2], Mark Joseph[3], *Leora Yarboro[4], Nicholas R. Teman[4], ***D****Gorav Ailawadi[4]
[1]Virginia Cardiac Services Quality Initiative, Falls Church, VA; [2]East Carolina Heart Institute, Charlottesville, VA; [3]Carilion Clinic, Roanoke, VA; [4]University of Virginia, Charlottesville, VA
Commercial Relationships: *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

Discussant: ***D****Anthony L. Estrera, *University of Texas Houston Medical School, Houston, TX*
Commercial Relationships: *A.L. Estrera: Consultant/Advisory Board: Gore

9:15 am - 9:30 am (page 148)
42V. The Buffalo Trunk Technique for Aortic Arch Reconstruction

Mohamed Eldeiry, Edward J. Bergeron, *Muhammad Aftab, ***D****Jay Pal, ***D***Joseph C. Cleveland, *David A. Fullerton, *Thomas B. Reece
University of Colorado, Aurora, CO
Commercial Relationships: *J. Pal: Research Grant: Medtronic; J.C. Cleveland: Research Grant: Abbott

Discussant: Eric E. Roselli, *Cleveland Clinic, Cleveland, OH*

9:30 am - 9:45 am (page 150)
43. The Addition of Aortic Root Procedures During Elective Arch Surgery Does Not Confer Added Morbidity nor Mortality

William B. Keeling**[1], David H. Tian[2], Jakob Heinz[3], Malakh Shrestha[4], Takuya Fujikawa[5], *Joel Corvera[6], Marco Di Eusanio[7], *Bradley G. Leshnower[1], ***D*Edward P. Chen[1]
[1]Emory University, Atlanta, GA; [2]International Aortic Arch Surgery Study Group, MacQuarie Park, New South Wales, Australia; [3]University of Essen, Essen, Germany; [4]University of Hannover, Hannover, Germany; [5]Kawasaki Aortic Center, Kawasaki, Japan; [6]Indiana University School of Medicine, Indianapolis, IN; [7]Politecnica University of Marche, Ancona, Italy
Commercial Relationships: *E.P. Chen: Speakers Bureau/Honoraria: Cryolife

FOURTH SCIENTIFIC SESSION B

9:45 am - 10:00 am (page 152)
44. Open Descending and Thoracoabdominal Repairs in Patients Younger Than 50 Years Old

Akiko Tanaka, Rana Afifi, Harleen K. Sandhu, Charles C. Miller, *Hazim J. Safi, ***D***Anthony L. Estrera
McGovern Medical School at UTHealth, Houston, TX
Commercial Relationships: *A.L. Estrera: Consultant/Advisory Board: Gore

Discussant: *Bradley G. Leshnower, *Emory University, Atlanta, GA*

THORACIC BREAKOUT

Cumberland Ballroom A

(Presentations are limited to seven minutes, followed by eight minutes of discussion open to the audience.)

Presenting authors are listed in bold.

Moderators: *Melanie A. Edwards, *Mitchell J. Magee and *Puja G. Khaitan

9:00 am - 9:15 am (page 154)
45. Optimal Surveillance for Node Negative Early Stage Esophageal Adenocarcinoma Following Esophagectomy

Tamar B. Nobel[1,2], Arianna Barbetta[1], Meier Hsu[1], Kay See Tan[1], Smita Sihag[1], *Matthew Bott[1], *James M. Isbell[1], Manjit S. Bains[1], *David R. Jones[1], *Daniela Molena[1]
[1]Memorial Sloan Kettering Cancer Center, New York, NY; [2]Mount Sinai Hospital, New York, NY

9:15 am - 9:30 am (page 156)
46. Enhanced Recovery (ER) After Pulmonary Lobectomy - Eliminating Foley Catheters - Have We Gone Too Far?

Travis C. Geraci, ***D***Robert J. Cerfolio
New York University, New York, NY
Commercial Relationships: *R.J. Cerfolio: Consultant/Advisory Board: AstraZeneca, ConMed, Covidien LP, C-SATS, Ethicon, Google/Johnson & Johnson, Intuitive Surgical, Medtronic, Myriad, ROLO-7, TransEnterix

9:30 am - 9:45 am (page 158)
47. Liposomal Bupivacaine Enhances the Pain-Control Benefits of Uniportal Thoracoscopic Lobectomy

Scott G. Louis, Chase King, Perel Baral, ***D*Nirmal Veeramachaneni**
The University of Kansas Medical Center, Prairie Village, KS
Commercial Relationships: N. Veeramachaneni: Consultant/Advisory Board: Pacira Pharmaceuticals

9:45 am - 10:00 am (page 160)
48V. Narcotic Free VATS Lobectomy

***D*Daniel L. Miller**
WellStar Health System, Marietta, GA
Commercial Relationships: *D.L. Miller: Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic

CONGENITAL BREAKOUT

Cumberland Ballroom B-C

(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

Presenting authors are listed in bold.

Moderators: *Kristine J. Guleserian and *Constantine Mavroudis

9:00 am - 9:15 am (page 162)
49. Double Aortic Arch With Kommerell Diverticulum

***Carl L. Backer**, Sandeep N. Bharadwaj, Osama Eltayeb, *Joseph M. Forbess, Andrada R. Popescu, Michael C. Monge
Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL

Discussant: *Brian E. Kogon, *University of Mississippi Medical Center, Jackson, MS*

9:15 am - 9:30 am (page 164)
50V. Surgical Treatment of Biventricular Outflow Tract Obstruction in Hypertrophic Cardiomyopathy

Ziyad M. Binsalamah, Rodrigo Zea-Vera, Marco A. Rodriguez, Susan W. Denfield, *Jeffrey S. Heinle
Texas Children's Hospital/ Baylor College of Medicine, Houston, TX

Discussant: *Joseph A. Dearani, *Mayo Clinic, Rochester, MN*

9:30 am - 9:45 am (page 166)
51. Factors Associated With Survival Following Extracorporeal Cardiopulmonary Resuscitation in Children

Nicholas Melvan, Michael Heard, Michael Wolf, Joel Davis, *Kirk R. Kanter, Shriprasad R. Deshpande, ***Bahaaldin Alsoufi**
Emory University School of Medicine, Atlanta, GA

9:45 am - 10:00 am (page 168)
52V. Correcting a Rare Congenital Anomaly in an Adult - A Case Report

William J. Parker[1] John Duggan[2], Samuel Richey[3], *Charles B. Huddleston[3], Junewai Reoma[1]
[1]Walter Reed National Military Medical Center, Beltsville, MD; [2]Uniformed Services University of the Health Sciences, Bethesda, MD; [3]St. Louis University School of Medicine, St. Louis, MO

Discussant: *Carlos M. Mery, *University of Texas Dell Medical School/ Dell Children's Hospital, Austin, TX*

FOURTH SCIENTIFIC SESSION B

10:00 am - 10:30 am
Break – Visit Exhibits
Magnolia Ballroom A-C

*10:10 am – 10:23 am (page 170)
Video Abstract Presentation in Exhibit Hall
Magnolia Ballroom A-C

Break-V3. Giant Left Main Coronary Artery Aneurysm: Evaluation and Surgical Repair

***Faisal G. Bakaeen**, Eric E. Roselli, Gosta B. Pettersson, Lars G. Svensson
Cleveland Clinic, Cleveland, OH

Discussant: ***D****Scott A. LeMaire, *Baylor College of Medicine, Houston, TX*
Commercial Relationships: *S.A. LeMaire: Consultant/Advisory Board: Biom'up; Other Research Support: CytoSorbents, W.L. Gore & Associates, Terumo Aortic

Video abstract presentations in the Exhibit Hall will begin approximately ten minutes after the scheduled break time has begun to allow for attendees to transition from the general session rooms into the Exhibit Hall. Actual presentation start times may vary. Each presentation is allotted eight minutes followed by another five minutes of discussion.

GENERAL SESSION (All attendees and guests welcome)

FRIDAY, NOVEMBER 9, 2018

Magnolia Ballroom D-G

10:30 am - 10:50 am
CME Credits Available: .25

Moderator: *William A. Baumgartner

Kent Trinkle Education Lectureship Panel

New Paradigms in Residency Education: Insights on Current Challenges and Surgical Training

10:31 am – 10:38 am
***John H. Calhoon**
University of Texas Health Science Center, San Antonio, TX

10:38 am – 10:45 am
***John A. Kern**
University of Virginia Health System, Charlottesville, VA

10:45 am – 10:50 am
Open Discussion

10:50 am – 11:00 am
Break – Visit Exhibits
Magnolia Ballroom A-C

FOURTH SCIENTIFIC SESSION C

11:00 am - 12:00 pm
Simultaneous Adult Cardiac, Thoracic, Congenital, and Surgical Transcatheter Interventions Breakout Sessions

CME Credits Available: 1.0
Attendees select to participate in one of the following four breakout sessions:

ADULT CARDIAC BREAKOUT

Magnolia Ballroom D-G

(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience. Papers listed without a discussant, do not have one assigned. All discussion time will remain open to the audience.)

Presenting authors are listed in bold.

Moderators: *Thomas M. Beaver and Jeffrey B. Rich
Resident Moderator: Corinne Aberle

11:00 am - 11:15 am (page 172)
53. Early Failure of Tissue Valves Following Aortic Valve Replacement

Nishant Saran, *Sameh Said, Kevin Greason, *John M. Stulak, *Simon Maltais, Alberto Pochettino, Richard Daly, *Joseph Dearani, *Hartzell Schaff
Mayo Clinic, Rochester, MN

Discussant: *Ravi K. Ghanta, *Baylor College of Medicine, Houston, TX*

11:15 am - 11:30 am (page 174)
54. Surgical Ablation of Atrial Fibrillation in Patients with Tachycardia-Induced Cardiomyopathy

Ali J. Khiabani, Taylan Adademir, Matthew R. Schill, Laurie A. Sinn, Richard B. Schuessler, *Marc R. Moon, *Spencer J. Melby, ***D***Ralph J. Damiano
Washington University School of Medicine, St. Louis, MO
Commercial Relationships: *R.J. Damiano: Consultant/Advisory Board: Medtronic; Speakers Bureau/Honoraria: AtriCure, Edwards Lifesciences, LivaNova

Discussant: ***D***James R. Edgerton, *The Heart Hospital, Dallas, TX*
Commercial Relationships: *J.R. Edgerton: Speakers Bureau/Honoraria: AtriCure

11:30 am - 11:45 am (page 176)
55. Impact of the Use of Novel Oral Anticoagulants Versus Warfarin on Rates of Postoperative Effusions After Coronary Artery Bypass Grafting

Dishen Lin, Michael A. Catalano, Frank Manetta, Hugh Cassiere, Alan R. Hartman, Pey-Jen Yu
Northwell Health, Manhasset, NY

Discussant: ***D***Michael E. Halkos, *Emory University, Atlanta, GA*
Commercial Relationships: *M.E. Halkos: Consultant/Advisory Board: Medtronic

11:45 am - 12:00 pm (page 178)
56. Extracorporeal Membrane Oxygenation Prior to Ventricular Assist Device Placement is a Risk Factor for Future Pump Thrombus

DJordan Hoffman[1], **Navin Vigneshwar**[1], Christopher Pierce[2], Patrick Hosokawa[2], ***D***Joseph C. Cleveland[1]
[1]University of Colorado, Denver, CO; [2]University of Colorado, Aurora, CO
Commercial Relationships: J. Hoffman: Research Grant: Colorado Clinical and Translational Sciences Institute (CCTSI); J.C. Cleveland: Research Grant: Abbott

Discussant: *Mark S. Slaughter, *University of Louisville, Louisville, KY*

THORACIC BREAKOUT

Cumberland Ballroom A

(Presentations are limited to seven minutes, followed by eight minutes of discussion open to the audience.)

Presenting authors are listed in bold.

Moderators: *Mara B. Antonoff and *Erin A. Gillaspie
Resident Moderator: William Z. Chancellor, *University of Virginia, Charlottesville, VA*

11:00 am - 11:15 am (page 180)
57. Postoperative Supplementary Chemotherapy Could Not Improve Survival of Advanced ESCC Patients Underwent Surgery Following Neoadjuvant Chemotherapy

Ke-Neng Chen, **Wanpu Yan**, Peiliang Zhao, Hao Fu, Yao Lin, Zhongwu Li, Liang Dai, Yongbo Yang, Xiaozheng Kang
Peking University Cancer Hospital, Beijing, China

11:15 am - 11:30 am (page 182)
58V. Laparoscopic Repair of Paraconduit Herniation After Esophagectomy

Tamar B. Nobel, Arianna Barbetta, Smita Sihag, *Manjit S. Bains, *David R. Jones, *Daniela Molena
Memorial Sloan Kettering Cancer Center, New York, NY

11:30 am - 11:45 am (page 184)
59. Predictors of Mediastinal Involvement After Neoadjuvant Chemoradiation in Adenocarcinoma of the Gastroesophageal Junction

Kyle G. Mitchell, Naruhiko Ikoma, David Nelson, Dipen M. Maru, Jeremy J. Erasmus, *Ara Vaporciyan, *Mara B. Antonoff, *Reza J. Mehran, *David C. Rice, ***D***Jack A. Roth, *Stephen G. Swisher, *Boris Sepesi, *Garrett L. Walsh, Arlene Correa, Brian D. Badgwell, *Wayne L. Hofstetter
University of Texas, MD Anderson Cancer Center, Houston, TX
Commercial Relationships: J.A. Roth: Research Grant: Varian

11:45 am - 12:00 pm (page 186)
60. Performance of the Trans-Oral Circular Stapler for Thoracic Anastomosis After Induction Therapy for Advanced Esophageal Cancer

Lily Wang, Steven Milman, Thomas Ng
The Warren Alpert Medical School of Brown University, Providence, RI

FOURTH SCIENTIFIC SESSION C

CONGENITAL BREAKOUT

Cumberland Ballroom B-C

(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience. Papers listed without a discussant, do not have one assigned. All discussion time will remain open to the audience)

Presenting authors are listed in bold.

Moderators: *Joseph A. Dearani and *Kirk R. Kanter

11:00 am - 11:15 am (page 188)
61. Comprehensive Valve Program in Patients With Congenital Heart Disease Undergoing Re-Entry Right Ventricular Outflow Tract Intervention in the Transcatheter Era: Review of Outcomes and Cost Analysis

Joshua Kalish[2], Brendan Shafer[1], Lauren Mathis[1], Zahid Amin[2], ***Anastasios C. Polimenakos**[1]
[1]Children's Hospital of Georgia, Augusta, GA; [2]Medical College of Georgia, Augusta, GA

Discussant: Christopher J. Knott-Craig, *Le Bonheur Children's Hospital, Memphis, TN*

11:15 am - 11:30 am (page 190)
62. Role of Pulmonary Valve Z-Score in Valve-Sparing Surgical Repair of Tetralogy of Fallot - Systematic Review

***Raina Sinha**, Vasu Gooty, Subin Jang
University of Minnesota, Minneapolis, MN

Discussant: ***D***Christopher E. Mascio, *Children's Hospital of Philadelphia, Philadelphia, PA*
Commercial Relationships: *C.E. Mascio, Consultant/Advisory Board: HeartWare

11:30 am - 11:45 am (page 192)
63V. Novel Approach to Repair of Tetralogy of Fallot With Absent Pulmonary Valve Syndrome and Severe Airway Compression

Christina L. Greene, *Richard D. Mainwaring, Frank L. Hanley
Stanford University, Stanford, CA

11:45 am - 12:00 pm (page 194)
64. Failure to Rescue in Humanitarian Congenital Cardiac Surgery

***Tyler J. Wallen**[1], Marci Fults[3], Randa Blenden[2], Janet Nwaukoni[3], Marilyn Le[3], Nuha Fariha[3], Rodrigo Soto[2]
[1]The University of Florida, Gainesville, FL; [2]The International Children's Heart Foundation, Memphis, TN; [3]Philadelphia College of Osteopathic Medicine, Philadelphia, PA

Discussant: William M. Novick, *University of Tennessee, Collierville, TN*

SURGICAL TRANSCATHETER INTERVENTIONS BREAKOUT

Ossabaw A

(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience. Papers listed without a discussant, do not have one assigned. All discussion time will remain open to the audience.)

Presenting authors are listed in bold.

Moderator: *D**Kevin D. Accola and *Mark E. Sand
Commercial Relationships: *K.D. Accola: Speakers Bureau/Honoraria: Edwards Lifesciences

11:00 am - 11:15 am (page 196)
65. In-Hospital and 2-Year Outcomes Comparing TAVR Using Transcarotid, Transapical and Transaortic Access

D*Keith B. Allen**[1], ***DAdnan K. Chhatriwalla[1], David Cohen[1], Sanjeev Aggarwal[1], Zuhair Hawa[1], John Saxon[1], John R. Davis[1], Alex Pak[2], Zafir Hawa[2], Jim Mitchell[2], *A. Michael Borkon[1]
[1]St. Luke's Mid America Heart Institute, Kansas City, MO; [2]North Kansas City Hospital, North Kansas City, MO
Commercial Relationships: K.B. Allen: Research Grant: Abbott, Edwards Lifesciences, Medtronic; Speakers Bureau/Honoraria: Edwards Lifesciences; A.K. Chhatriwalla: Speakers Bureau/Honoraria: Abbott Vascular, Edwards Lifesciences, Medtronic

11:15 am - 11:30 am (page 198)
66. Prevalence of and Risk Factors for Permanent Pacemaker Implantation After Aortic Valve Replacement

Melissa Levack, Samir Kapadia, *Edward Soltesz, ***D***A. Marc Gillinov, Penny Houghtaling, *Eugene Blackstone, Lars G. Svensson, Stephanie L. Mick
Cleveland Clinic, Cleveland, OH
Commercial Relationships: A.M. Gillinov: Consultant/Advisory Board: Abbott, AtriCure, ClearFlow, Cryolife, Edwards Lifesciences, Medtronic; Ownership Interest: ClearFlow

Discussant: Lorraine D. Cornwell, *Baylor College of Medicine, Houston, TX*

11:30 am - 11:45 am (page 200)
67. Expanding TAVR Indications and the Impact Bicuspid Aortic Stenosis – An Outcomes Based Assessment

Kristen A. Sell-Dottin, Jaimin R. Trivedi, *Mark S. Slaughter
University of Louisville, Louisville, KY

Discussant: *D*S. Chris Malaisrie, *Northwestern University, Chicago, IL*
Commercial Relationships: S.C. Malaisrie: Consultant/Advisory Board: Cryolife, Edwards Lifesciences; Speakers Bureau/Honoraria: Abbott, Edwards Lifesciences; Other Research Support: Cryolife, Edwards Lifesciences, Vascutek

11:45 am - 12:00 pm (page 202)
68. Does the Integrated Risk Assessment by the Heart Team Predict Outcomes After Transcatheter Aortic Valve Replacement (TAVR)?

Michael A. Catalano, Dishen Lin, ***D***Bruce Rutkin, Rick A. Esposito, Gregory Maurer, Alan R. Hartman, Pey-Jen Yu
Northwell Health, Manhasset, NY
Commercial Relationships: B. Rutkin: Consultant/Advisory Board: Medtronic

Discussant: *Danny Chu, *UPMC Heart & Vascular Institute, Pittsburgh, PA*

FOURTH SCIENTIFIC SESSION C

12:00 pm – 1:00 pm
Lunch on Own

A variety of sandwiches, wraps and salads, along with sides and beverages, will be available for purchase in the Magnolia Ballroom Foyer. Should you wish to venture out and explore the property, several Omni restaurants are open for lunch. Resort maps, restaurant hours and descriptions, are available at Registration, and shuttles will make frequent trips as needed.

12:00 pm – 1:00 pm
Early Practitioners Luncheon
Ossabaw B
Cardiothoracic surgeons in practice less than 10 years are invited to attend this luncheon to network with other early practitioners.

12:45 pm – 3:30 pm
EXHIBITS OPEN
Magnolia Ballroom A-C

1:00 pm – 1:30 pm
Break – Visit Exhibits
Magnolia Ballroom A-C

1:30 pm – 2:45 pm
Magnolia Ballroom D-G

CME Credits Available: 1.25

1:30 pm - 2:15 pm
Managing the New Anticoagulants: Surgical Perspectives and Strategies

Moderator: ***D****Kevin D. Accola
Commercial Relationships: *K.D. Accola: Speakers Bureau/Honoraria: Edwards Lifesciences

DJerrold H. Levy, MD
Professor of Anesthesiology / Surgery, Co-Director of Cardiothoracic ICU
Duke University Hospital, Durham, NC
Commercial Relationships: J.H. Levy: Consultant/Advisory Board: Boehringer Ingelheim, CSL Behring, Octapharma Plasma, Instrumentation Laboratory
Regulatory Disclosure: This presentation describes the use of prothrombin complex concentrates (PCCs) for emergency reversal of anticoagulants and bleeding, which is not FDA approved.

Educational Objectives: Upon completion of this program participants should be able to:
- Review pharmacology and monitoring of the non-vitamin K oral anticoagulants dabigatran, rivaroxaban, apixiban, edoxaban, betrixaban;
- Describe current specific management and reversal strategies/antidotes for patients undergoing cardiothoracic surgery;
- Discuss management of bleeding of patients receiving these agents

2:15 pm – 2:45 pm (page 204)
Harold Urschel History Lectureship

Moderator: *John W. Hammon

69. One Hundred and Counting: Dr. Dwight C. McGoon's Enduring Legacy

Pouya Hemmati, Arman Arghami, *Joseph Dearani, Richard Daly, *Hartzell Schaff
Mayo Clinic, Rochester, MN

2:45 pm – 3:30 pm
Break – Visit Exhibits
Magnolia Ballroom A-C

*2:55 pm – 3:08 pm (page 206)
Video Abstract Presentation in Exhibit Hall

Break-V4. Novel Cannulation Technique for Temporary Right Ventricular Assist Device After LVAD Placement

William Z. Chancellor, Jared P. Beller, Emily A. Downs, *Leora Yarboro
University of Virginia, Charlottesville, VA
Regulatory Disclosure: This presentation describes the off-label use of the Centrimag Ventricular Assist Device.

Discussant: ***D***Michael Z. Tong, *Cleveland Clinic, Cleveland, OH*
Commercial Relationships: M.Z. Tong: Consultant/Advisory Board: Abbott, ABIOMED

Video abstract presentations in the Exhibit Hall will begin approximately ten minutes after the scheduled break time has begun to allow for attendees to transition from the general session rooms into the Exhibit Hall. Actual presentation start times may vary. Each presentation is allotted eight minutes followed by another five minutes of discussion.

FIFTH SCIENTIFIC SESSION

3:30 pm – 4:30 pm
Magnolia Ballroom D-G

(Presentations are limited to seven minutes, followed by eight minutes of discussion open to the audience.)

Presenting authors are listed in bold.

CME Credits Available: 1.0

Moderators: *Jeffrey P. Jacobs and *Virginia R. Litle

3:30 pm - 3:45 pm (page 208)
70. Novel Preoperative Huddle Email Improves Perioperative Efficiency

Zachary M. Tyerman**, *James H. Mehaffey, *Robert B. Hawkins, *Leora Yarboro, ***DGorav Ailawadi, *Nicholas R. Teman
University of Virginia, Charlottesville, VA
Commercial Relationships: *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

Discussant: *Thoralf M. Sundt, *Massachusetts General Hospital, Boston, MA*

3:45 pm - 4:00 pm (page 210)
71. Lung Cancer Patient Perceptions of the Value of an Outreach Thoracic Surgical Clinic

Zoya Mohammad, Kyle G. Mitchell, David Nelson, Courtney Robb, Claudine Jreissaty, Janet Tu, *Mara B. Antonoff
University of Texas, MD Anderson Cancer Center, Houston, TX

Discussant: Scott M. Atay, U*niversity of Southern California, Keck School of Medicine, Los Angeles, CA*

4:00 pm - 4:15 pm (page 212)
72. Response to Neoadjuvant Treatment for Esophageal Cancer May Predict Increased Incidence of Brain Metastases Compared to Other Metastasis Sites

Tamar B. Nobel[1,2], Nikita K. Dave[3], Arianna Barbetta[1], Smita Sihag[1], *David R. Jones[1], *Daniela Molena[1]
[1]Memorial Sloan Kettering Cancer Center, New York, NY; [2]Mount Sinai Hospital, New York, NY; [3]Rutgers New Jersey School of Medicine, Newark, NJ

Discussant: *Wayne L. Hofstetter, *University of Texas, MD Anderson Cancer Center, Houston, TX*

4:15 pm - 4:30 pm (page 214)
73. A 25-Year Experience With the Ross Procedure in Children

***Damien J. LaPar**[1,2], Eliana Al Haddad[1], *Paul Chai[1,2], David Kalfa[1,2], Amee M. Shah[1], Maria Thanjan[3], Patrick Flynn[2], Jan M. Quaegebeur1, Emile A. Bacha[1,2]
[1]Columbia University College of Physicians and Surgeons, New York, NY; [2]Weill Cornell College of Medicine, New York, NY; [3]New York Presbyterian Hospital, New York, NY

Discussant: *John W. Brown, *Indiana University School of Medicine, Indianapolis, IN*

4:30 pm – 5:15 pm
STSA Annual Business Meeting (Members Only)
Magnolia Ballroom D-G

5:15 pm- 5:45 pm
2018 Cardiothoracic Surgery Jeopardy Competition for North America - Final Round
Magnolia Ballroom D-G

DINNER GALA

7:00 pm – 7:30 pm
Reception
Magnolia Ballroom Foyer

7:30 pm – 10:00 pm
Dinner Gala
Magnolia Ballroom D-G

POSTGRADUATE PROGRAM (All attendees and guests welcome)

SATURDAY, NOVEMBER 10, 2018

7:00 am – 8:00 am
POSTGRADUATE PROGRAM BREAKFAST BUFFET
Magnolia Ballroom Foyer

8:00 am – 10:00 am
POSTGRADUATE PROGRAM GENERAL SESSION
Magnolia Ballroom D-G

CME Credits Available: 2.0

The Postgraduate will host its second General Session on Saturday morning beginning with a light breakfast buffet to fuel your morning. Spouses and guests are encouraged to attend. With a theme of "The Past, Present and Future," the program will feature special presentations that encompass topics currently trending within cardiothoracic surgery. These topics include physician resilience, surgeon performance metrics and a special discussion with one of our cardiothoracic surgery legends.

The Past, Present, and Future

Moderators: ***D****Kevin D. Accola, ***D****Daniel L. Miller and *Jeffrey P. Jacobs
Commercial Relationships: *K.D. Accola: Speakers Bureau/Honoraria: Edwards Lifesciences; *D.L. Miller: Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic

Educational Objectives: Upon completion of this program participants will be able to:
- Discuss fact versus fiction about the incidence and causes of physician burnout;
- Specify at least four evidence-based strategies for promoting physician resilience;
- List three strategies for assessing and deepening teamwork in health care settings;
- Discuss evident-based solutions to work/life challenges employed by busy physicians and thriving medical families;
- Explain leadership traits that cardiothoracic surgeons might wish to develop more fully;
- Discuss current and future practices relevant to cardiothoracic surgery;
- Review surgeon-level reporting and identify solutions to present challenges

8:00 am - 8:45 am
Choosing Resilience: The Key to Thriving Through Change

Presenter: ***D***Wayne Sotile
Sotile Center for Resilience, Davidson, NC
Commercial Relationships: W. Sotile: Ownership Interest: AMA Press

8:45 am – 9:10 am
A Conversation with a Legend: *G. Alexander Patterson[1]

Interviewer: ***D****Daniel L. Miller[2]
[1]Washington University School of Medicine, St. Louis, MO
[2]Wellstar Health System, Marietta, GA
Commercial Relationships: *D.L. Miller: Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic

9:10 am – 9:20 am
Open Discussion

9:20 am - 9:50 am
Surgeon Performance Metrics: Why, What and When?

David M. Shahian
Massachusetts General Hospital, Boston, MA

9:50 am – 10:00 am
Open Discussion

10:00 am
PROGRAM ADJOURNS

SCIENTIFIC PAPERS

1B. A 40-Year Analysis of NIH-Funded Cardiac Transplantation Research: Surgeons Lead the Way

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Authors: *Adishesh K. Narahari, *James H. Mehaffey, Anirudha S. Chandrabhatla, Pranav K. Baderdinni, Allison Weiderhold, *Robert B. Hawkins, Mark Roeser, *Irving Kron, *Leora Yarboro, ***D***Gorav Ailawadi, Nicholas R. Teman
Commercial Relationships: *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

Author Institution(s): *University of Virginia, Charlottesville, VA*

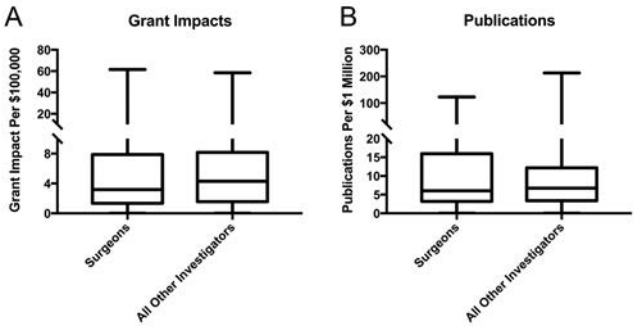
Discussant: *Todd K. Rosengart, *Baylor College of Medicine, Houston, TX*

Objectives: Obtaining National Institutes of Health (NIH) funding for heart transplant research is becoming increasingly difficult, especially for surgeons. We sought to determine the productivity of NIH funded cardiac transplantation research over the past 40 years.

Methods: NIH Research Portfolio Online Reporting Tools Expenditures and Results (RePORTER) was queried for R01s using ten heart transplant related terms. Principal investigator, total grant funding amount, number of publications, and journal impact factors were collected. A previously utilized Grant Impact Metric was assigned to each grant: sum of impact factors of each manuscript's journal normalized by the funding of the respective grant (per $100K). The department and background degree(s) (MD, PhD, MD/PhD) for each funded principal investigator were identified from institutional faculty profiles.

Results: A total of 331 cardiac transplantation R01s to 261 investigators were reviewed, resulting in 6529 publications in over 800 journals. Surgeons receive more grants to study cardiac transplantation than any other clinician-scientists (n = 79, $155 million; Medicine: n = 76, $185 million; Pathology: 10, $28 million; Radiology/Rad Onc: 4, $9 million). Surgeons perform equally well compared to all other principal investigators with respect to Grant Impact Metric (3.2 vs 4.3; p = 0.60; **Figure 1A**) and publications per $1 million (6.0 vs 6.7; p = 0.98; **Figure 1B**). Finally, all clinician-scientists (MDs) have a significantly higher Grant Impact Metric compared to non-clinician researchers (non MDs) (4.8 vs 3.2; p = 0.01).

Conclusions: Surgeon-scientists are equally productive compared to all other researchers (non surgeons) despite decreasing funding rates at the NIH and greater pressure from administrators to increase clinical productivity.



A) Grant Impact Metric of each grant awarded to surgeons (MD holders in Department of Surgery n = 79) or all other investigators (n = 252) (p = 0.60).

B) Publications per $1 Million for each grant awarded to surgeons (MD holders in Department of Surgery n = 79) or all other investigators (n = 252) (p = 0.98).

Notes:

2B. VA ECMO Exacerbates LV Distension and Promotes Lung Edema While a LVAD Unloads LV in Severe Cardiogenic Shock: A Numerical Simulation Study

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Authors: Po-Lin Hsu[1], Yuxin Zhu[1], Dongfang Wang[2], Cherry Ballard-Croft[2], Michael Sekela[2], ***Joseph B. Zwischenberger**[2]

Author Institution(s): *[1]Soochow University, Suzhou, China; [2]University of Kentucky, Lexington, KY*

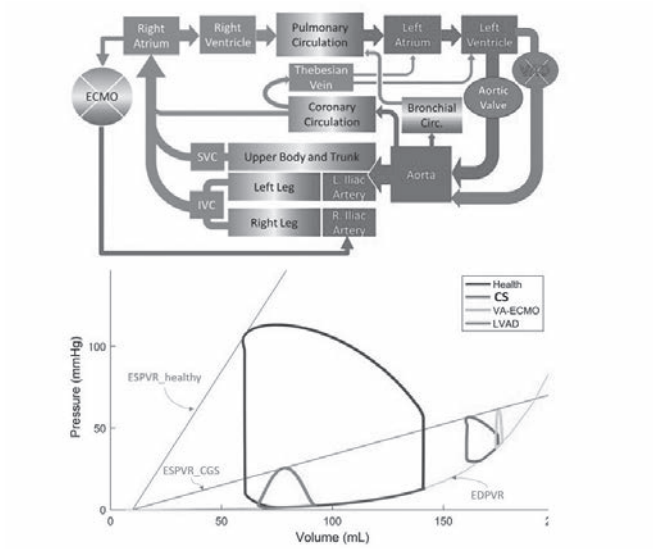
Discussant: ***D***Michael Z. Tong, *Cleveland Clinic, Cleveland, OH*
Commercial Relationships: M.Z. Tong: Consultant/Advisory Board: Abbott, ABIOMED

Objectives: Both VA ECMO and LVAD can reestablish collapsed systemic circulation in severe cardiogenic shock (CS) but their effects on LV unloading are distinct. In this study, we simulated VA ECMO/LVAD-supported severe CS to quantitatively analyze their LV unloading mechanics.

Methods: The numerical lumped-parameter model of human circulatory system included the bronchial circulation and coronary circulation with Thebesian veins (**Fig 1A**). Healthy circulation was simulated with cardiac output (CO), mean aortic pressure (mAoP), mean pulmonary artery pressure (mPAP), end diastolic LV pressure (EDLVP), end diastolic LV volume (LVEDV), LV internal work and LV total work. In severe CS, CO was input at 1.0 l/min. Femoral VA ECMO and LV to Aorta LVAD were imported into the above CS model with ECMO/LVAD blood flow similar to normal CO (5.5 l/min).

Results: The mathematical model simulated healthy, severe CS and severe CS plus VA ECMO/LVAD circulations (**Table 1**). The healthy circulation parameters were in normal range. Severe CS was simulated with a decreased mAoP(49 mmHg), increased LVEDP(39 mmHg) and increased LVEDV. Both VA ECMO and LVAD normalized collapsed circulation of CS (mAoP 80 mmHg). However, VA ECMO increased LVEDP (42 mmHg) and LVEDV (177 ml) with shift in P-V loop to upper right (**Fig1B**), exacerbating LV distension. This high LVEDP resulted in significant high pulmonary capillary wedge pressure (32 mmHg), promoting lung edema. The LVAD restored normal LVEDP (2 mmHg) and LVEDV (92 ml) with P-V loop shifted to lower left (**Fig1B**), showing efficient LV unloading. VA ECMO increased LV internal/total work, while the LVAD significantly decreased LV internal/ total work.

Conclusions: In severe CS, VA ECMO exacerbates LV distension, increases LV internal/total work and promotes lung edema. An LVAD efficiently unloads LV and decreases LV internal/total work.



	Healthy	Severe CS	VA ECMO	LVAD
CO(L/min)	5.25	1	-0.35	-0.5
Pump Flow(L/min)			5.5	5.5
LVEDP (mmHg)	12	39	42	2
LVEDV (ml)	141	175	177	92
mAoP (mmHg)	78	49	80	80
mPAP (mmHg)	17	34	32	8
mLAP (mmHg)	11	32	33	3
Pulmonary Capillary Wedge Pressure (mmHg)	13	32	32	8
LV Internal Work (J/beat)	0.35	0.37	0.40	0.1
LV Strok Work (J beat)	1	0.03	0.01	0.03
LV total work (J/beat)	1.35	0.40	0.42	0.13

Effects of VA ECMO/LVAD on Circulation in Severe CS

Notes:

3B. High Inflammatory Markers in Peripheral Blood are Associated With Recurrence in Patients With pT1 Non-Small Cell Lung Cancer Undergoing Surgical Resection

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Authors: Anita Sulibhavi[1], Sainath Asokan[1], Jesse Schacht[1], Benedict Daly[2], Hiran C. Fernando[3], *Virginia R. Litle[2], Kei Suzuki[2]

Author Institution(s): *[1]Boston University School of Medicine, Boston, MA; [2]Boston Medical Center, Boston, MA; [3]Inova Fairfax Hospital, Fairfax, VA*

Discussant: *Matthew J. Bott, *Memorial Sloan Kettering Cancer Center, New York, NY*

Objectives: There is a paucity of prognostic indicators for stage I non-small cell lung cancers (NSCLC) undergoing surgical resection, particularly for pT1 lesions. This study investigates the prognostic role of inflammatory markers in the peripheral blood of patients with stage I NSCLC undergoing resection.

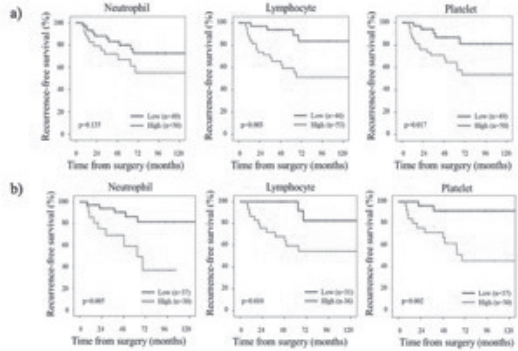
Methods: A retrospective chart review was undertaken at an urban safety-net hospital. Inclusion criteria restricted subjects to patients with stage I NSCLC who had surgery as sole treatment from 2000-2015, had available baseline complete blood counts (CBC) and follow-up. Patients who died within 30 days of surgery were excluded. The primary end-point was recurrence. From pre-operative CBC, inflammatory markers were analyzed, and median values were used as cut-offs. Statistical analysis was performed using Kruskal-Wallis tests and Kaplan-Meier curves.

Results: There were 314 patients identified as potential subjects. Ultimately, 100 patients met inclusion criteria. High lymphocyte count was associated with higher recurrence (5-year RFS 85% for low lymphocyte vs 51% for high lymphocyte, p=0.003). High platelet count was associated with higher recurrence (5-year RFS of 81% for low platelet vs 54% for high platelet, p=0.017). In patents with pT1 lesions, high neutrophil, lymphocyte, and platelet counts were associated with higher recurrence. Neither neutrophil-to-lymphocyte ratio (NLR) nor platelet-to-lymphocyte ratio (PLR) were significantly associated with recurrence (p=0.14 and p=0.83, respectively). Patients with squamous cell cancer tended to have higher counts of neutrophils (p=0.038) and platelets (p=0.049), and higher NLR (p=0.019).

Conclusions: In patients with pathologic stage I NSCLC undergoing surgical resection, inflammatory markers from peripheral blood may provide prognostic value. Of significance, in patients with pT1N0 NSCLC, high neutrophil, lymphocyte, and platelet counts were all associated with higher recurrence.

4	13 (2.5%)	15 (2.9%)	21 (2%)
Clinical N stage			
0	255 (48.4%)	257 (49.2%)	506 (48.5%)
1	204 (38.7%)	196 (37.5%)	413 (39.6%)
2	60 (11.4%)	60 (11.5%)	109 (10.4%)
3	8 (1.5%)	9 (1.7%)	16 (1.5%)
TNM Clinical Stage			
0	0 (0%)	2 (0.4%)	2 (0.2%)
1	123 (23.3%)	123 (23.6%)	255 (24.4%)
2	176 (33.4%)	179 (34.3%)	357 (34.2%)
3	228 (43.3%)	218 (41.8%)	430 (41.2%)
No significant differences between groups. Values are median (Interquartile Range) or number (%).			

Figure 1: Recurrence-free survival by peripheral blood markers in a) all study subjects and b) subjects with pT1 lesions



Notes:

4B. 3D Printed Cardiac Patch Augments Angiogenesis and Reduces Scar Tissue Formation in Vivo

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Authors: Enoch Yeung, Fukunishi Takuma, Yang Bai, Djahida Bedja, Isaree Pitaktong, Gunnar Mattson, Cecillia Lui, Chin Siang Ong, Hiroshi Matsushita, Taka Inoue, Narutoshi Hibino

Author Institution(s): *Johns Hopkins University, Baltimore, MD*

Discussant: *Joseph W. Turek, *Duke University Medical Center, Durham, NC*

Objectives: Heart failure is one of the leading causes of death worldwide. The number of patients with heart failure continues to increase despite advances in its management. Stem cell injection therapy approaches have been developed, yet, these methods have so far produced only limited improvement of cardiac function, largely due to the poor retention of injected stem cells. Our lab's recently developed bio 3D printed cardiac tissue has the potential to improve cardiac function due to the long-term retention of a high number of stem cells. The objective of this study is to evaluate the in vivo regenerative potential of the bio 3D bioprinted cardiac tissue.

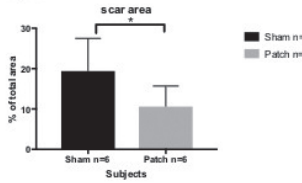
Methods: Cardiac patch was created with bio 3D printing technology using spheroid created from the co-culture of human iPS cell derived cardiomyocytes, human cardiac fibroblasts and endothelial cell. The cardiac patch was implanted into rat myocardial infarction model (n=6). Control group (n=6) without cardiac patch implantation was used for comparison. Echocardiography, histology, scar area analysis and quantification of vascularization were done 4 weeks after surgery.

Results: At 4 weeks after surgery, survival rate was 100% and 83% in the experimental group and control group, respectively. Average vessel counts within infarcted area in the cardiac patch group were higher than those of the control group ($p = 0.001$). The scar area in the cardiac patch group was significantly smaller than that of the control group ($p = 0.048$). Echocardiography showed a trend of improvement of cardiac function.

Conclusions: 3D printed cardiac patch has the potential of angiogenesis in infarcted tissues and reduction of scar area formation.

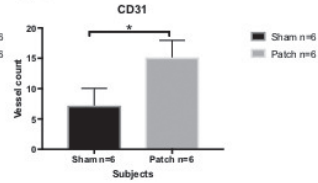
	Patch Group (n=6)	Sham Group (n=6)	p value
Survival Rate	100%	83%	
Histology Quantification			
Vessels Counts in Infarcted Area	15.13 +/- 2.82	7.17 +/- 2.85	0.001
Scar Area (%)	10.6 +/- 5.1	19.39 +/- 8.1	0.048
Echocardiography Assessment			
Ejection Fraction (%)	50.0 +/- 18.9	40.1 +/- 14.4	0.36
Left Ventricular Mass (g)	860.9 +/- 151.5	1150.5 +/- 357.2	0.1
Cardiac Output (ml/min)	104.6 +/- 45.5	68.6 +/- 16.4	0.1

Figure 1



Statistical analysis of scar area (percentage = blue / total area) (p= 0.048)

Figure 2



Statistic analysis of vessel counting (p = 0.001)

Notes:

5B. FDG-PET SUVm Does Not Correlate With Glucose Metabolism in Non-Small Cell Lung Cancer

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Authors: *Kemp H. Kernstine, Brandon Faubert, Christopher Hensley, Ling Cai, Jose Torrealba, Dwight Oliver, Robert E. Lenkinski, Craig R. Malloy, ***D*** Ralph J. Deberardinis

Author Institution(s): *UT Southwestern Medical Center, Dallas, TX*
Commercial Relationships: Consultant/Advisory Board: Agios Pharmaceuticals

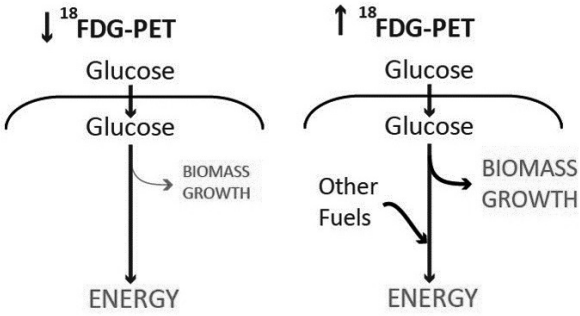
Discussant: *Joseph B. Zwischenberger, *University of Kentucky, Lexington, KY*

Objectives: In non-small cell lung cancer (NSCLC), fluorodeoxyglucose positron emission tomography (FDG-PET) assists in diagnosing, staging, and evaluating treatment response. One parameter of the FDG-PET, the maximum standard uptake value (SUVm), appears as an objective measure of cancer viability and altered tumor glycolysis. The objective is to use metabolic flux analysis to determine if the SUVm is predictive of glycolytic tumor metabolism.

Methods: In this prospective IRB-approved clinical trial, 41 untreated potentially-resectable patients with confirmed NSCLC underwent FDG-PET computed tomography and dynamic contrast enhanced (DCE) magnetic resonance imaging. On the day of surgery, the patients received a steady state infusion of ^{13}C-glucose prior to resection. Blood, tumor (T), and normal lung (NL) tissue samples were analyzed by metabolite mass spectrometry analysis and compared with clinical parameters including SUVm, DCE tissue perfusion, oncogenotype, tumor volume (TV), stage, and grade.

Results: There were 14 males, 16 never-smokers, mean age 67 (43-84), mean TV 15.44 cm^3 (0.1-171.9), and mean SUVm 8.17 (0.7-29.2; 7 were < 2.5). Tumors and adjacent lungs were analyzed for ^{13}C-enrichment and total metabolite levels. Tumors with low SUVm displayed similar enrichment and abundance of glycolytic metabolites to FDG avid tumors. Conversely, FDG avid tumors had greatly increased pentose phosphate pathway (PPP) metabolites, indicating a greater flow to biosynthesis and tumor growth. In addition, FDG avid tumors were positively correlated with metabolic markers indicating the use of other oxidative fuel sources, including lactate.

Conclusions: Although all FDG-PET-positive tumors metabolized glucose, the SUV did not predict the overall extent of glycolytic metabolism. SUVm instead predicted the use of glucose as biosynthetic fuel through the pentose phosphate pathway.



Low SUVm vs High SUVm Primary NSCLCs: Glycolytic Pathway Comparison of Biomass Growth

Notes:

6B. Cardiac Biomarkers sST-2 and NT-proBNP Predict Long-Term Survival After Cardiac Surgery

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Authors: Niveditta Ramkumar[1], *Jeffrey P. Jacobs[2], Richard B. Berman[1], Devin M. Parker[1], Todd MacKenzie[1], ***D***Donald S. Likosky[3], Anthony DiScipio[4], Jeremiah Brown[1]
Commercial Relationships: D.S. Likosky: Research Grant: AHRQ, NIH; Consultant/ Advisory Board: AmSECT

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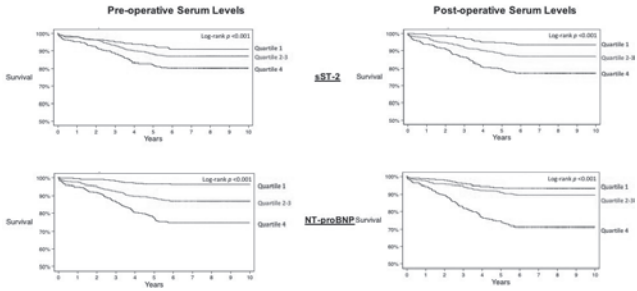
Objectives: Cardiac biomarkers such as soluble ST2 (sST-2) and N-terminal prohormone of BNP (NT-proBNP) may be associated with long-term survival after cardiac surgery. Our objective was to explore the relationship between pre- and post-operative serum biomarker levels and long-term survival after cardiac surgery.

Methods: Patients undergoing cardiac surgery from 2004-2007 were enrolled in a prospective biomarker cohort in the Northern New England Cardiovascular Disease Study Group Registry. Pre- and post-operative serum biomarker levels were categorized by quartile. We used Kaplan-Meier survival analysis and Cox regression models adjusted for variables in the STS's ASCERT long-term survival calculator to study the association of biomarker levels with long-term survival. Following Kaplan-Meier analysis, quartiles 2 and 3 were found to have similar survival and were therefore combined into one category.

Results: In our cohort (N=1,648), median follow-up time was 8 years (IQR: 7.5-9.7), during which there were 267 deaths. The rate for survival up to 10 years was 86%. Kaplan-Meier survival analysis demonstrated a significant ($p<0.001$) difference across quartiles of pre- and post-operative biomarker levels (**Figure**). After adjustment, pre- and post-operative biomarker levels in quartile 4 (highest serum levels) measured at both time points were significantly predictive of worse survival (hazard ratio range 1.5 to 2.0, all $p<0.05$) (**Table**); however, levels of sST-2 and NT-proBNP in quartiles 2-3 demonstrated a non-statistically significant trend with long-term survival.

Conclusions: Elevated pre- and post-operative levels of sST-2 or NT-proBNP are associated with increased risk of worse survival after cardiac surgery. These biomarkers can be used for risk stratification or estimating postsurgical prognosis.

Figure



Kaplan-Meier survival curves by pre- and post-operative biomarker levels.

Table: Adjusted hazard ratios for long-term mortality by quartiles of pre- and post-operative serum levels of sST-2 and NT-proBNP.

Biomarker Levels (ng/mL)	% Dead	Adjusted‡		
		HR	95% CI	p-value
Pre-operative				
sST-2				
<3.195	10%	1.0 (ref)	-	-
3.195-5.87	15%	1.36	0.96 - 1.93	0.08
>5.87	22%	1.52	1.04 - 2.23	0.03
NT-proBNP				
<1.005	3.9%	1.0 (ref)	-	-
1.005-5.71	15%	1.75	1.17 - 2.62	0.01
>5.748	29%	2.11	1.35 - 2.32	<0.01
Post-operative				
sST-2				
< 26.366	7.5%	1.0 (ref)	-	-
26.366 -83.866	14%	0.93	0.67 - 1.29	0.67
> 83.866	27%	1.66	1.17 - 2.35	<0.01
NT-proBNP				
<7.952	6.5%	1.0 (ref)	-	-
7.955-25.202	12%	0.81	0.57 - 1.14	0.22
>25.202	33%	1.46	1.01 - 2.09	0.04

* HR= hazard ratio; CI= confidence interval; ‡ Adjusted for ASCERT variables: age, weight, height, creatinine, ejection fraction, mean aortic gradient, sex, ethnicity, diabetes, cerebrovascular disease, cigarette smoking, congestive heart failure class, prior cardiac operation, cardia status, number of diseased coronary vessels, myocardial infarction, and valve insufficiency.

Notes:

1. Procedural Volume Does Not Correlate With Publically Reported Outcomes in Adult Cardiac Operations

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Objectives: Statewide public reporting is utilized for individual surgeon and hospital evaluation, quality improvement, and to provide transparency in outcomes to the public. The objective of this study is to evaluate the correlation between procedural volume and publically reported outcomes following adult cardiac surgery.

Methods: The Pennsylvania Health Care Cost Containment Council (PHC4) statewide public reporting databases were analyzed. Isolated coronary artery bypass grafting (CABG), isolated valve surgery, and CABG plus valve surgery performed between 2014-2016 were included. The primary outcomes were operative mortality and 30-day readmission. Expected operative mortality and 30-day readmission were calculated using the risk models developed by PHC4. Observed-to-expected (OE) ratios were correlated with procedural volume using linear regression analysis.

Results: The study included 29,578 operations (16,641 isolated CABGs, 8,618 isolated valves, and 4,319 CABG plus valves) performed by 182 surgeons at 60 hospitals. The predicted risk of operative mortality for surgeons was 1.5%, 1.8%, and 4.3%, and for hospitals, 1.5%, 1.7%, and 4.3% for isolated CABGs, isolated valves, and CABG plus valves, respectively. Predicted 30-day readmission for surgeons and hospitals was 10.3% and 10.2%, 13.4% and 13.2%, and 14.4% and 14.3% for the same operations, respectively. There was no correlation between surgeon or hospital volume and either predicted risk or observed-to-expected operative mortality or 30-day readmission for any of the index operations **(Table and Figure)**.

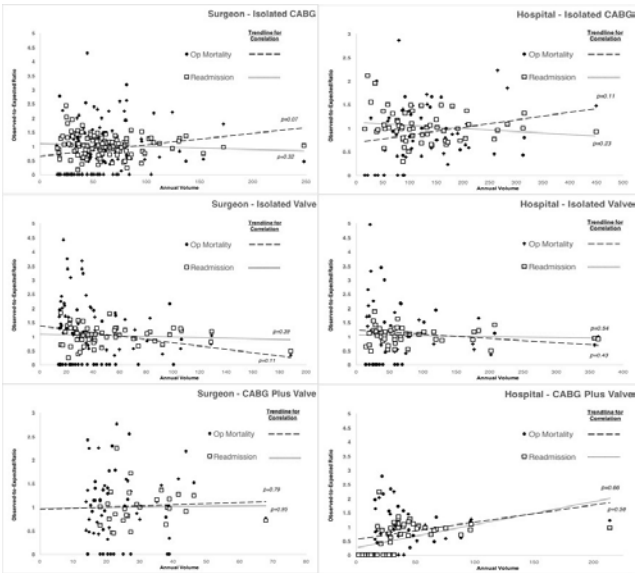
Conclusions: In this study of 29,578 index adult cardiac operations, there was no correlation between surgeon or hospital procedural volume and expected or observed-to-expected operative mortality or 30-day readmission. These data suggest that lower volume surgeons or hospitals provide care for similar risk patients in index operations with comparable publically reported outcomes.

Linear Regression Analysis for Correlation Between Volume and Outcomes

Category	Regression Coefficient and 95% CI for Correlation Between Volume and OE for Operative Mortality	p-value	Regression Coefficient and 95% CI for Correlation Between Volume and OE for 30-Day Readmission	p-value
Surgeon - Isolated CABG	+0.0019 (-0.0002 to +0.0039)	0.07	-0.0005 (-0.0014 to +0.0005)	0.32
Surgeon - Isolated Valve	-0.0026 (-0.0058 to +0.0006)	0.11	-0.0005 (-0.0017 to +0.0007)	0.39
Surgeon - CABG plus Valve	+0.0012 (-0.0076 to +0.0100)	0.79	+0.0002 (-0.0065 to +0.0069)	0.95
Hospital - Isolated CABG	+0.0007 (-0.0002 to +0.0017)	0.11	-0.0003 (-0.0008 to +0.0002)	0.23
Hospital - Isolated Valve	-0.0007 (-0.0025 to +0.0011)	0.43	-0.0002 (-0.0007 to +0.0004)	0.54
Hospital - CABG plus Valve	-0.0008 (-0.0035 to +0.0020)	0.58	-0.0003 (-0.0018 to +0.0012)	0.66

+ means positive correlation: increasing volume correlates with increasing observed-to-expected ratio; - means inverse correlation: increasing volume correlates with decreasing observed-to-expected ratio; 95% CI is 95% confidence interval

Correlation Between Surgeon or Hospital Annual Volume and Observed-to-Expected Operative Mortality and 30-Day Readmission Rates



2V. Unicuspid Aortic Valve Repair Using Geometric Ring Annuloplasty

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Objectives: Bicuspid valves with fusion of both the right/left and right/non-coronary commissures generally are called Sievers Type 2 or unicuspid aortic valves (UAV). This anatomy can be difficult to repair with existing techniques.

Methods: A 32-year old athlete, with fatigue and Class II congestive heart failure, presented with severe aortic insufficiency and early left ventricular dysfunction. Transesophageal echocardiography showed a UAV defect with a large non-coronary sinus. The posterior AI jet was severe from prolapse of the fused right/left cusp. On inspection, both the right/left and right/non-coronary commissures were severely fused and calcified. Commissurotomies were performed, and using ultrasonic and sharp debridement, the leaflets were gently freed of calcium and fibrous tissue. The low-profile bicuspid ring was made of Titanium and covered with Dacron, and had circular base geometry with two 180° sub-commissural posts that flared outward by 10°. A 21-mm ring was sutured into the sub-annular position with 9 trans-annular horizontal mattress sutures to equalize the geometry of the fused right/left and the non-coronary annuli. After ring placement, the non-coronary leaflet was plicated and raised to a reference 8-mm effective height, and the right/left cleft was closed to raise the right/left fused leaflet free-edge to the same level as the non-coronary cusp.

Results: The lengths and the effective heights of the 2 reconstructed leaflets were nicely equalized, and the valve opened well. On echo, the leaflets showed good mobility, with no residual leak, and a 13 mm Hg mean systolic pressure gradient. The patient recovered uneventfully.

Conclusion: Unicuspid aortic valves can be repaired with 2-leaflet reconstructions, if the non-coronary sinus is large. The bicuspid annuloplasty ring produces major remodeling of the fused right-left annulus to the size of the non-coronary annulus, facilitating UAV repair.

Notes:

3. Minimally Invasive Esophagectomy is Associated With Superior Long-Term Survival Compared to Open Esophagectomy in a Propensity Matched Analysis of the National Cancer Database

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Objectives: Minimally invasive esophagectomy (MIE) has been associated with reduced perioperative morbidity but not a long-term survival advantage compared to open approaches. We investigated survival differences between MIE, including laparoscopic and robotic techniques, and open esophagectomy.

Methods: Patients undergoing esophagectomy from 2010-14 with T1-4N1-3M0, adenocarcinoma or squamous cell histology, in middle or lower esophagus were queried from the National Cancer Database and stratified into groups based on their surgical procedure: robotic assisted minimally invasive (RAMIE), laparoscopic (LMIE), or open esophagectomy (OE). Propensity matching (1:1) was done between RAMIE and LMIE to produce an MIE group. The MIE group was matched to OE yielding a 1:1:2 matching of RAMIE:LMIE:OE. Postop outcomes and survival (Kaplan-Meier) were compared between groups.

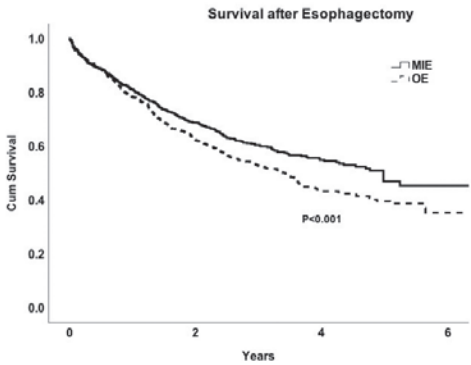
Results: Prior to matching, 7,435 patients met inclusion criteria and a greater portion underwent OE (67.7%) than MIE (LMIE 24.9%, RAMIE 7.4%). Matching yielded similar groups (RAMIE= 527, LMIE = 522, OE =1,044) (**Table 1**). Compared to OE, MIE patients had a significantly greater number of nodes sampled (16 vs 14, p <0.001 and R0 resections (96.0% vs 93.6%, p=0.013). OE was associated with a longer post-operative stay (10 vs 9 days, p=0.04). There was no significant difference in survival at 30 and 90 days between the MIE and open group (p=0.893, 0.894). However, median survival after MIE was significantly greater than OE (4.98 vs 3.43 years, p=0.001) (**Figure 1**). No survival difference existed between RAMIE and LMIE (p=0.698).

Conclusions: MIE is associated with increased number of nodes examined and a shorter post-operative length of stay. After propensity matching, patients undergoing MIE had better long but not short-term survival than OE. This suggests MIE may have potential oncologic benefits over open esophagectomy. This benefit seems to be independent of the use of robotic technology.

Baseline Characteristics of Matched Groups

Baseline characteristics	Robotic (n=527)	Laparoscopic (n=522)	Open (n=1,044)
Age	64 (57-71)	65 (57-71)	65 (58-70)
No Comorbidities	381 (72.3%)	375 (71.8%)	766 (73.4%)
White	491 (93.2%)	500 (95.8%)	977 (93.6%)
Male Gender	437 (83.7%)	871 (83.4%)	446 (84.6%)
Insurance			
Medicare	258 (49.0%)	270 (51.7%)	530 (50.8%)
Other	36 (6.8%)	35 (6.7%)	65 (6.2%)
Private	233 (44.2%)	217 (41.6%)	449 (43.0%)
Center Esophagectomy Volume	34 (14-125)	42 (18-86)	37 (11-87)
Academic/Research/Integrated Network Cancer Program	441 (83.7%)	447 (85.6%)	890 (85.2%)
Lower tumor location (vs middle)	470 (89.2%)	473 (90.6%)	926 (88.7%)
Neoadjuvent chemotherapy or radiation	404 (76.7%)	387 (74.1%)	772 (73.9%)
Squamous cell carcinoma (vs adenocarcinoma)	77 (14.6%)	73 (14%)	150 (14.4%)
Clinical T stage			
1	91 (17.3%)	96 (18.4%)	196 (18.8%)
2	99 (18.8%)	118 (22.6%)	221 (21.2%)
3	324 (61.5%)	293 (56.1%)	606 (58%)

Figure 1: Survival after esophagectomy between minimally invasive (MIE) and open esophagectomy (OE).



4. Impact of Microbiological Organism Type on Surgically Managed Endocarditis

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Discussant: *Faisal G. Bakaeen, *Cleveland Clinic, Cleveland, OH*

Objectives: This study is the first to describe the impact of organism and valve type on surgically managed infective endocarditis (IE) from the Society of Thoracic Surgeons (STS) database. Previous risk models for surgically managed endocarditis have not included microbiological organism.

Methods: The STS database was queried for adult patients with surgically managed endocarditis from 7/1/11-6/30/16. Outcomes were compared based on (1) causative microbiological organism, (2) valve type (native vs. prosthetic), and (3) right (tricuspid) versus left (mitral, aortic) sided endocarditis. Univariate and risk adjusted models were developed with odds ratios for mortality for each organism type referenced against streptococcus.

Results: The study population included 20033 (93%) operations for left-sided and 1599 (7%) for right sided IE. Streptococcus (28%) and staphylococcus (27%) were the most common infecting organisms, followed by enterococcus (11%). After multivariate adjustment, microbiological organism type was significantly associated with operative mortality for patients with left-sided endocarditis: adjusted odds ratio 2.9 for fungal, 1.4 for staph, and 1.3 for culture negative versus streptococcus. For right sided endocarditis, there were no differences in outcomes by organism type. Left sided prosthetic valve endocarditis had a higher operative mortality than left sided native valve endocarditis (12% vs. 8%; $p<0.0001$). In contrast, surgery for right sided endocarditis carried lower operative mortality, with no mortality difference between prosthetic valve endocarditis and native valve endocarditis (5% vs. 4%; $P=0.6$).

Conclusions: Organism type influences the operative mortality for left sided endocarditis. Surgery for left sided and prosthetic valve endocarditis is associated with higher operative mortality. Risk adjustment for operative outcomes in endocarditis may need to account for microbiological organism type.

Organism Frequencies and Association of Organism Type with 30-Day Mortality

Organism	Frequency	Operative / 30-day Mortality	Adjusted OR	P-value
Streptococcus species (reference)	32%	6%	-	-
Staphylococcus aureus	26%	11%	1.41	<0.01
Enterococcus species	15%	8%	0.95	0.61
Culture negative	11%	9%	1.35	<0.01
Other	11%	8%	1.15	0.20
Coagulase negative staphylococcus	4%	11%	1.00	0.98
Fungal	1%	17%	2.89	<0.01

Notes:

5. The Importance of Noncardiac Congenital Disease: Refining The Society of Thoracic Surgeons (STS) Congenital Heart Surgery Database (CHSD) Mortality Risk Model With Enhanced Adjustment for Chromosomal Abnormalities, Syndromes, and Noncardiac Congenital Anatomic Abnormalities

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Discussant: *Robert Jaquiss, *UT Southwestern Medical Center, Dallas, TX*

Objectives: The STS CHSD Mortality Risk Model adjusts for patient factors, including the binary presence or absence of a chromosomal abnormality (CA), syndrome (S), and/or noncardiac congenital anatomic abnormality (NCAA). This analysis refines case mix adjustment by adding more granular adjustment for individual CA, S, and NCAA, based on a hypothesis that associated mortality risk differs between individual conditions.

Methods: Syndromes and CA corresponding to the same condition were merged to a single condition code. For S and CA with at least 10 deaths in neonates and infants and at least 10 deaths in children and adults, we estimated odds ratios for the effect of the CA/S separately in neonates/infants and in children/adults. In addition to these condition/age interactions, we explored condition/age/procedure interactions. So, for Down syndrome, we estimated the condition's effect within separate subgroups based on age and specific procedure types, including AV canal repair and single ventricle palliation.

Finally, 5 maximally homogeneous groups of CA/S were created from 81 candidate CA/S variables using Bayesian logistic regression modelling. A standard logistic regression model then incorporated indicator variables for the 5 categories of CA/S, 7 unique NCAA, and all other covariates in the current STS CHSD Mortality Model.

Results: Analysis included 107,062 operations at 100 centers (2010–2015). Operative Mortality = 3629 (3.4%).

Figure 1 shows Odds Ratios for each of the 81 CA/S and illustrates the 5 categories.

Table 1 shows Adjusted Odds Ratios for 5 categories of CA/S (with pertinent examples provided) and 7 unique NCAA.

The C Statistic of the augmented STS CHSD Mortality Model in the development sample was 0.875.

Conclusions: To optimize adjustment for case mix, an augmented STS CHSD Mortality Risk Model has been developed that includes all covariates from the previously published model plus additional covariates representing individual CA, S, and NCAA.

Figure 1: Odds Ratio for each of the 81 Chromosomal Abnormalities/Syndromes, illustrating the 5 categories of Chromosomal Abnormalities/Syndromes

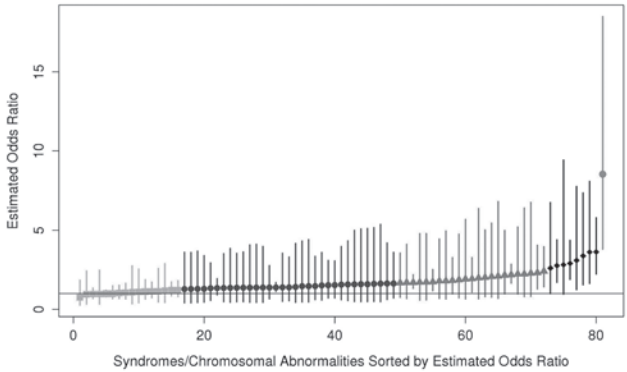

Table 1: Adjusted Odds Ratio for the 5 categories of Chromosomal Abnormalities/Syndromes and the 7 individual Noncardiac Congenital Anatomic Abnormalities that are added to the new model

Effect	Adjusted OR (95% CI)	P-value	Examples
Chromosomal Abnormalities/Syndromes (CA/S)			
Highest Risk Group 5: Syndrome and CA	21.27 (10.44, 43.34)	<.0001	Trisomy 21/Down syndrome and Glenn or Fontan operation (Infants and Neonates)
Risk Group 4: Syndrome and CA	4.29 (3.36, 5.47)	<.0001	(1) Trisomy 13/Patau syndrome; (2) Trisomy 18/Edwards syndrome; (3) Heterotaxy syndrome, Asplenia syndrome (Children and Adults)
Risk Group 3: Syndrome and CA	2.27 (1.91, 2.70)	<.0001	(1) Alagille syndrome (intrahepatic biliary duct agenesis); (2) Williams syndrome (Williams-Beuren syndrome)/7q11.23
Risk Group 2: Syndrome and CA	1.68 (1.45, 1.94)	<.0001	1) Goldenhar syndrome; (2) Jacobsen syndrome
Lowest Risk Group 1: Syndrome and CA	0.98 (0.85, 1.14)	0.8187	(1) DiGeorge syndrome/22q11 deletion (Infants and Neonates); (2) Trisomy 21/Down syndrome and CAVSD repair
Noncardiac Congenital Anatomic Abnormalities (NCAA)			
Omphalocele	3.43 (2.20, 5.35)	<.0001	
Gastroschisis	3.13 (1.03, 9.52)	0.0441	
Congenital diaphragmatic hernia (CDH)	2.61 (1.69, 4.04)	<.0001	
Tracheoesophageal fistula (TEF)	1.64 (1.18, 2.27)	0.003	
Anal Atresia (imperforate anus)	1.16 (0.84, 1.60)	0.3794	
Intestinal malrotation	0.99 (0.79, 1.25)	0.9581	
Hirschsprung	0.80 (0.36, 1.79)	0.589	

6. Outcomes of Repair of Kommerell Diverticulum

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Commercial Relationships: *J.S. Coselli: Consultant/Advisory Board: Medtronic, Vascutek Terumo (Royalties Coselli Branched Graft), W.L. Gore & Associates; Research Grant: Abbott, Bolton Medical, Edwards Lifesciences, Medtronic, Vascutek Terumo, W.L. Gore & Associates; Other Research Support: Vascutek Terumo

Objectives: To assess outcomes of open and endovascular repair of Kommerell Diverticulum (KD).

Methods: Between 1997 and 2016, 162 adult patients presented with KD, 97 had no intervention, and 65 underwent repair with open repair (n=54, 18 elephant trunk (ET) procedures, (10 with aortic dissection), including 7 frozen ET, and completions 4 TEVAR, 2 open, 5 lost) or endovascular (n=11) procedures. Non-ET open KD repairs consisted of resection (n=15), interposition graft (n=16) patch (n=4), aortopexy (n=1). Maximum KD diameter was 2.1 cm for nonsurgical and 3.2 cm for surgical patients. Among surgery patients, 51/65 had dysphagia or dyspnea. XX patient years of follow up were available.

Results: For surgery or endovascular patients, after multi-variable adjustment, symptoms and hypertension predicted likelihood of surgery ($p<0.05$, all). There was no operative death. Complications included tracheostomy (n=3, 4.6%), vocal cord paralysis (n=2, 3%) and re-operation for bleeding (n=3, 4.6%). During follow-up, 3/10 endovascular patients required reinterventions for endoleaks, and one patient post-aortopexy had residual symptoms. Among non-surgical patients, two patients refused surgery, and 1 died due to rupture, with a 4.7 cm descending aorta and 3.4 cm KD. Seven additional patients died due to non-aortic comorbidities. The remaining patients are asymptomatic with aortic diameter <4.5cm. Eleven patients were lost to follow-up.

Conclusions: Open and endovascular approaches have a high success rate and low mortality risk. Selection of the specific type of intervention should be based on patient's anatomy, additional needed procedures, and comorbid conditions.

Notes:

7. The Efficacy of Re-Resection is Superior to Non-Surgery for Recurrence/ Second Primary Lung Cancer After Initial Curative Treatment

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Objectives: The current retrospective study aims to determine the surgical safety and oncological efficacy of multiple pulmonary resections (MPR) for locally recurrent or second primary lung cancer after initial curative treatment.

Methods: The prospective lung cancer database between January 2000 and July 2015 was retrospectively reviewed. The patients who underwent MPR, including both synchronous and metachronous resections, were enrolled. The surgical safety endpoints included postoperative mortality and complications (Clavien-Dindo classification) within 30 days. The oncological efficacy endpoints included 5-year overall survival (OS) and 5-year disease free survival (DFS) for the synchronous MPR group, and 5-year OS after first surgery and 5-year progression free survival (PFS) after second surgery for the metachronous MPR group, respectively. A propensity score matching method (1 : 5) was applied to compare the survival outcomes between the synchronous MPR group and the solitary lung cancer resection (SLCR) group.

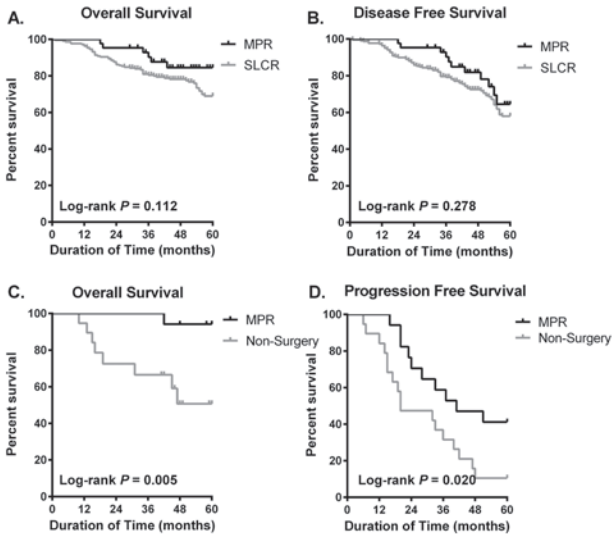
Results: Among the 1,887 consecutive primary lung cancer patients in the prospective database, a total of 67 MPR cases were identified. There was no severe complications or mortality within 30 days after surgery in the MPR group. The 5-year OS and DFS of the synchronous MPR group were 84.5% and 64.4%, respectively. The differences of 5-year OS and DFS between the MPR group and the matched SLCR group were not statistically significant. The 5-year OS after the first surgery and the 5-year PFS after the second surgery were 94.1% and 41.2%, respectively. Both were significantly better than the non-surgical treatment group (5-year OS, 50.7%; 5-year PFS, 10.5%).

Conclusions: The oncological efficacy of MPR is superior to non-surgical approach in the management of the local recurrence or second primary lung cancer after initial curative resection, with comparable postoperative mortality and complications.

The demographic and clinicopathologic characteristics of lung cancer patients with multiple pulmonary resections (n = 67)

Items	n (%)
Age (years)	
< 60	19 (28)
≥ 60	48 (72)
Gender	
Male	42 (63)
Female	25 (37)
Temporal Pattern	
Synchronous	50 (75)
Metachronous	17 (25)
Location Distribution	
Ipsilateral	38 (57)
Bilateral	29 (43)
Histological Subtype *	
Both ADC	48 (72)
ADC + Non-ADC	4 (6)
Both Non-ADC	9 (13)
Sum of Size (mm) †	
≤ 40	36 (54)
> 40	29 (43)
Clinical Stage (AJCC TNM 8th)	
I	48 (72)
II	4 (6)
III	3 (4)
IV	8 (12)
Unspecified	4 (6)
Extent of Resection	
L + L	14 (21)
P/L + S/W	47 (70)
S/W or Others	6 (9)

*The histological subtype of 61 cases were available. † The Size of 65 cases were available. Abbreviations: ADC = adenocarcinoma; L = lobectomy; P = pneumonectomy; S = segmentectomy; W = wedge resection.



Survival comparisons between the synchronous MPR group and the SLCR group (A. OS; B. DFS), and between the metachronous MPR group and the non-surgery group (C. OS; D. PFS).

8. Cardiac Surgery Trainees as "Skin-to-Skin" Operating Surgeons: Midterm Outcomes

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Authors: Jordan P. Bloom, Elbert E. Heng, Hugh G. Auchincloss, Serguei Melnitchouk, Mauricio Villavicencio, David D'Alessandro, *Thoralf Sundt, George Tolis

Author Institution(s): *Massachusetts General Hospital, Boston, MA*

Objectives: We have previously demonstrated that cardiac surgery trainees can safely perform operations "skin-to-skin" with adequate attending surgeon supervision. We sought to further demonstrate the safety and efficacy of this teaching method past the 30-day mark by comparing midterm outcomes of cases done entirely by a trainee to cases done entirely by a single attending surgeon.

Methods: 100 consecutive cases (82 CABG, 9 AVR, 7 CABG+AVR, 2 other) performed by residents (group R) were matched 1:1 by procedure to non-consecutive cases done by a single attending surgeon (group A) from July 2014 to October 2016. Patients were stratified based on whether the attending surgeon or trainee performed every critical step of the operation, "skin-to-skin". Outcomes included death, major morbidity and readmission.

Results: Patients in the two groups were similar with respect to demographics and comorbidities. The median follow-up time for patients in this study was 28 months (IQR 23-35 months). There were 7 (3.5%) deaths (4 in group A, 3 in group R, p=0.7). Of the 43 (21.5%) patients who were readmitted during the study term, 27 (13.5%) patients were readmitted for causes related to surgery (11 in group A, 16 in group R, p=0.02). The most common reasons for readmissions related to surgery were chest pain (n=11), pleural effusion requiring drainage (n=8), pneumonia (n=4) and unstable angina requiring percutaneous coronary intervention (n=3). There were no statistically significant differences in the reasons for readmission between group A or group R.

Conclusions: The equivalence of post-operative outcomes previously demonstrated at 30 days, persists at midterm follow-up. Our data indicate that trainees can be educated in operative cardiac surgery, under the current paradigm, without sacrificing outcome quality. It is reasonable to expect academic programs to continue providing trainees experience as primary operating surgeons.

Notes:

9. Progress in Heart Transplantation for Pediatric and Congenital Cardiac Disease: A Comparison of Two Eras Over 22 Years and 179 Transplants at a Single Institution

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Authors: *Jeffrey P. Jacobs[1,3], Genevieve C. Tuite[1,2], Alfred Asante-Korang[1,3], Sharon R. Ghazarian[1], Bethany Wisotzkey[1], Shawn M. Shah[1,4], Gary Stapleton[1], Jamie Decker[1], Carrie Herbert[1,3], Vyas Kartha[1], Plato Alexander[1], Jennifer Carapellucci[1], *Diane Krasnopero[1], Jade Hanson[1], Neil Goldenberg[1,3], Nhue L. Do[1,3], *Constantine Mavroudis[1,3], Tom R. Karl[1,3], *James A. Quintessenza[5]

Author Institution(s): *[1]Johns Hopkins All Children's Hospital, St. Petersburg, FL; [2]University of Notre Dame, Notre Dame, IN; [3]Johns Hopkins University, Baltimore, MD; [4]University of Virginia, Charlottesville, VA; [5]University of Kentucky, Lexington, KY*

Discussant: *Kirk R. Kanter, Emory University School of Medicine, Atlanta, GA*

Objectives: In order to assess changes in patterns of practice and outcomes over time, we reviewed all patients who underwent heart transplantation (HTx) at our institution and compared two consecutive eleven-year eras based on significant changes in our immunosuppressive protocol.

Methods: Retrospective study of 172 patients undergoing 179 HTx (167 first time transplants, 10 second transplants, and 2 third transplants) from June 1995 through June 2017. In 2006, we commenced pre-transplant desensitization for highly-sensitized patients and also started using tacrolimus instead of cyclosporin as our primary postoperative immunosuppressive agent.

Cohort 1 included 80 HTx performed between June 1995 and June 2006. Cohort 2 included 99 HTx performed between July 2006 and June 2017.

The primary outcome was mortality, and survival was modeled by the Kaplan-Meier method.

Univariable and multivariable Cox proportional hazard models were performed to identify prognostic factors for the primary outcome.

Results: Our 179 HTx included 18 neonates, 79 infants, 80 children, and 2 adults (>18 years). Median age was 264 days (range: 5 days - 24 years). Median weight was 7.5 kg (range: 2.2 to 113 kg).

Patients in Cohort 1 were less likely to have been immunosensitized preoperatively (12.5% versus 25.3%, p-value=0.032).

Kaplan-Meier analysis (**Figure 1**) suggested superior survival for patients in Cohort 2 (p=0.001) both one and five years after HTx.

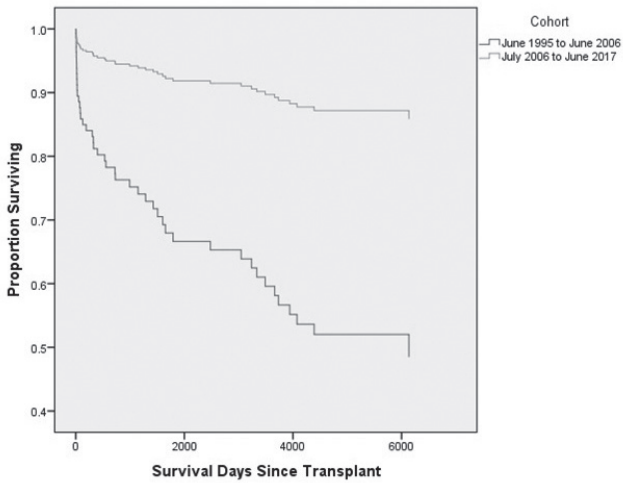
Cox analysis (**Table 1**) identified era (Cohort 1, p-value=0.001) and number of prior cardiac operations (p-value=0.021) as risk factors for mortality.

Conclusions: Our analysis of 22 years of pediatric and congenital HTx at a single institution reveals superior one-year survival and five-year survival in the most recent 11 year era, despite the higher proportion of patients with elevated panel reactive antibody in the most recent era. This improvement was temporally associated with a change in our immunosuppressive strategy.

Table 1: Multivariable Cox Proportional Hazard Models for Overall Mortality

Variable	Hazard Ratio (95% CI)	p-value
Cohort 2	**0.22 (0.09, 0.56)**	**0.001**
Age at Transplant	0.98 (0.84, 1.13)	0.734
Weight	1.01 (0.98, 1.04)	0.724
Gender (Male)	1.72 (0.91, 3.25)	0.097
Race (White)	0.99 (0.46, 2.09)	0.969
High PRA	1.46 (0.60, 3.56)	
Pre-Transplant Mechanical Support	2.20 (0.91, 5.34)	0.08
Redo Sternotomy	1.11 (0.50, 2.49)	0.794
Prior OHT	2.75 (0.58, 12.92)	0.201
Heterotaxy	2.69 (0.79, 9.12)	0.064
Number of Prior Cardiac Operations	**1.37 (1.05, 1.80)**	**0.021**
Days on Waiting List	1.01 (1.00, 1.01)	0.122
Cardiopulmonary Bypass Time	0.99 (0.99, 1.00)	0.151
Aortic Cross Clamp Time	1.00 (1.00, 1.01)	0.095

Figure 1: Kaplan-Meier analysis of patient survival by era (p=0.001)



Notes:

10. Improved Mortality Associated With the Use of Extracorporeal Membrane Oxygenation as a Bridge to Lung Transplantation

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Authors: Alison L. Halpern, Patrick Kohtz, Laura Helmkamp, Mohamed Eldeiry, Maggie M. Hodges, ***D***John D. Mitchell, *Muhammad Aftab, ***D****Jay Pal, ***D***Joseph C. Cleveland, *Thomas B. Reece, Robert Meguid, *David A. Fullerton, Michael J. Weyant

Commercial Relationships: J.D. Mitchell: Consultant/Advisory Board: Medtronic; *J. Pal: Research Grant: Medtronic; J.C. Cleveland: Research Grant: Abbott

Author Institution(s): *University of Colorado Denver, Aurora, CO*

Discussant: Sudish Murthy, *Cleveland Clinic, Cleveland, OH*

Objectives: Our objective was to evaluate the effect of pretransplantation extracorporeal membrane oxygenation (ECMO) on long-term survival after lung transplantation and determine the degree to which transplant center volume affects this relationship.

Methods: Using the United Network for Organ Sharing database, a retrospective cohort study was performed to evaluate the survival of patients undergoing lung transplantation between 2005 and 2017. Based on previous literature, transplantation centers were classified into three groups using their average annual lung transplant volume over the preceding 5 years; <25 , 25-49, and >50. Survival of ECMO and non-ECMO patients was analyzed using a log-rank test. Propensity scores for ECMO were calculated and used to generate weights to estimate the average treatment effect. A weighted proportional hazards model was used to compare ECMO and non-ECMO patients by center volume.

Results: 20,976 patients met inclusion criteria, with 611 (2.9%) undergoing pretransplantation ECMO. Pretransplantation ECMO was associated with increased post-transplantation hazard of mortality (hazard ratio (HR) 1.37, 95%CI 1.14-1.64, **Figure 1A**). Kaplan-Meier plots stratified by center volume suggest that pretransplantation ECMO associated mortality may be mitigated at high-volume centers (**Figure 1B-D**). In the propensity score-weighted proportional hazards model, hazard associated with ECMO decreased as center volume increased from 0 to 35 transplants per year. When centers perform more than 35 transplants per year, the effect of pretransplantation ECMO on mortality is no longer observed (**Figure 1E**).

Conclusions: Pretransplantation ECMO can be performed as a bridge to lung transplantation without significantly increasing patient mortality. Patients who undergo pretransplantation ECMO at lung transplant centers that perform more than 35 lung transplants annually have equivalent mortality to those who do not require ECMO prior to transplantation.

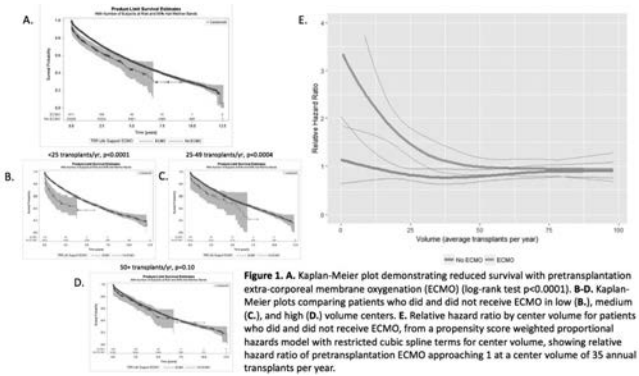

Figure 1. A. Kaplan-Meier plot demonstrating reduced survival with pretransplantation extra-corporeal membrane oxygenation (ECMO) (log-rank test p<0.0001). **B-D.** Kaplan-Meier plots comparing patients who did and did not receive ECMO in low (**B.**), medium (**C.**), and high (**D.**) volume centers. **E.** Relative hazard ratio by center volume for patients who did and did not receive ECMO, from a propensity score weighted proportional hazards model with restricted cubic spline terms for center volume, showing relative hazard ratio of pretransplantation ECMO approaching 1 at a center volume of 35 annual transplants per year.

Notes:

11. 30 Day Surgical Readmission Risk Score in a Statewide Database: Validation of a New Multivariate Risk Model

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Authors: Scott D. Barnett[1], *Eric L. Sarin[1], *Andy Kiser[5], ***D***Gorav Ailawadi[2], *Robert B. Hawkins[2], Zachary M. Tyerman[2], Jeffrey B. Rich[3], Mohammed Quader[4], ***D***Alan M. Speir[1]
Commercial Relationships: *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic; *A.M. Speir: Consultant/Advisory Board: Medtronic

Author Institution(s): *[1]Inova Heart and Vascular Institute, Falls Church, VA; [2]University of Virginia, Charlottesville, VA; [3]VCSQI, Newport News, VA; [4]Virginia Commonwealth University, Richmond, VA; [5]East Carolina Heart Institute, Greenville, NC*

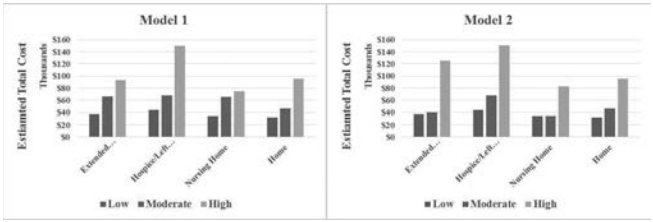
Discussant: *Richard L. Prager, *University of Michigan, Ann Arbor, MI*

Objectives: Hospital readmissions cost an estimated $41 billion in the United States each year. To address this, a single institution recently developed a new risk model predictive of 30 day readmission following adult cardiac surgery. The purpose of this study was to validate and refine this new readmission risk model using a statewide database.

Methods: A total of 16,409 patients from 2012 to 2016 were analyzed using a statewide STS database. We replicated the aforementioned multivariate model using the validated predictors (Model 1): race, hospital length of stay, chronic lung disease, operation type, and renal failure. Further, we added discharge location to a separate model (Model 2). 30 day readmission risk scores, low (0-10%), moderate (10-13%) and high (↗13%) risk categories were calculated based on modeled probabilities and associated with discharge location and total cost.

Results: The overall 30-day readmission rate was 11.1% in our dataset. Both Model 1 and 2 (OR: 1.09; 95% CI: 1.07-1.10 vs. OR: 1.09; 95% CI: 1.08-1.11) were significant predictors of 30 day readmission. Calculated AUC statistics for both models were similar 0.58 (95% CI: 0.57-0.60) and 0.58 (95% CI: 0.60-0.62). Statistically significant differences were observed across all risk categories in discharge location and total cost. 86% of low risk patients were discharged home vs. 66.9% and 62.5% of patients in the moderate and high risk groups, respectively ($p<0.001$). Total cost increased from $36,723 ± 4,153 in the low risk group to $61,527 ± 4,063 and $113,524 ± 4,107 in the moderate and high risk groups ($p<0.001$).

Conclusions: Both risk models significantly predicted 30 days readmission in our dataset and demonstrated that the 30 day readmission risk score presented is a valid and generalizable quality improvement tool. Further refinement is needed to predict this valuable and highly costly postoperative metric.


Model 1
Estiamted Total Cost
Thousands
$160
$140
$120
$100
$80
$60
$40
$20
$0
Extended...
Hospice/Left...
Nursing Home
Home
Low
Moderate
High
Model 2
Estiamted Total Cost
Thousands
$160
$140
$120
$100
$80
$60
$40
$20
$0
Extended...
Hospice/Left...
Nursing Home
Home
Low
Moderate
High

Notes:

12. Surveillance Patterns After Treatment of Non-Small Cell Lung Cancer With Lobectomy and Stereotactic Body Radiotherapy

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Authors: Kyle G. Mitchell, David Nelson, *Wayne L. Hofstetter, *Reza J. Mehran, ***D***Jack A. Roth, *Boris Sepesi, *Stephen G. Swisher, *Ara Vaporciyan, *Garrett L. Walsh, *David C. Rice, *Mara B. Antonoff
Commercial Relationships: J.A. Roth: Research Grant: Varian

Author Institution(s): *University of Texas, MD Anderson Cancer Center, Houston, TX*

Discussant: ***D****Shanda H. Blackmon, *Mayo Clinic, Rochester, MN*

Commercial Relationships: *S.H. Blackmon: Ownership Interest: Boston Scientific; Research Grant: Medtronic, truFreeze; Speakers Bureau/Honoraria: Ethicon, Medtronic, Olympus

Objectives: As interest is growing in applying stereotactic body radiotherapy (SBRT) to more fit candidates with non-small cell lung cancer (NSCLC), it is not clear that post-treatment surveillance has been comparable between various treatment modalities. We sought to characterize surveillance patterns after definitive-intent NSCLC therapy with SBRT and lobectomy.

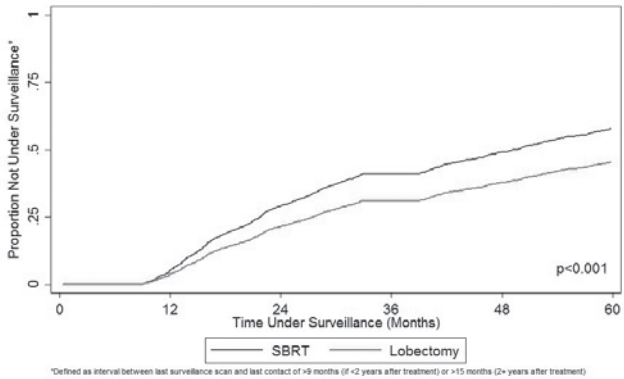
Methods: NSCLC patients treated with lobectomy or SBRT from 2006-2016 at a single institution were identified. Patients with metastatic disease at the time of treatment were excluded. Natural language processing (NLP) was used to search data fields within axial surveillance imaging reports for findings suggestive of recurrence.

Results: 3042 patients [2237 (74%) lobectomy, 805 (27%) SBRT)] met inclusion criteria. Though a similar number of patients had no surveillance imaging at our institution (SBRT 16%, lobectomy 15%,p=0.415), patients had a longer median duration of surveillance after lobectomy (28.0 months) than SBRT (12.3 months,p<0.001). NLP flagged 289 (15%) and 138 (21%) patients for suspected recurrence after lobectomy and SBRT (p=0.002). Patients flagged for suspected recurrence had longer surveillance duration than those who did not (lobectomy 43.3 vs 25.9 months,p<0.001; SBRT 26.8 vs 10.0,p<0.001). Histopathologic information after clinically suspected recurrence was more frequently obtained after lobectomy than SBRT (75% vs 48%,p<0.001). Patients with clinical stage I disease who had clinical suspicion of recurrence (n=261) had longer duration of follow-up after lobectomy than SBRT (47.4 vs 28.7 months,p<0.001).

Conclusions: We identified potential heterogeneity in surveillance patterns after treatment of NSCLC with two therapeutic modalities. As we seek to include SBRT in the armamentarium of options for healthier NSCLC patients, it will be critical to implement rigorous surveillance paradigms that are standardized across treatment modalities.

Cohort Characteristics

	Lobectomy N=2237	SBRT N=805	p
Follow-up axial imaging available Imaging No imaging	1900 (84.9) 337 (15.1)	674 (83.7) 131 (16.3)	0.415
NLP flagged as suspected recurrence Flagged Not flagged	289 (15.2) 1611 (84.8)	138 (20.5) 536 (79.5)	0.002
Actuarial two-year LRR, % (95% CI)*	9.6 (8.2-11.3)	13.7 (10.2-18.1)	0.001
Pathology after clinically suspected recurrence** Pathology obtained Pathology not obtained	206 (75.2) 68 (24.8)	54 (47.8) 59 (52.2)	<0.001
Surveillance duration (months), median (IQR)			
All patients with surveillance imaging (n=2574)	28.0 (43.7)	12.3 (19.6)	<0.001
NLP flag (n=427)	43.3 (55.7)	26.8 (23.7)	<0.001
cStage 1 with clinical suspicion of recurrence (n=261)	47.4 (54.9)	28.7 (26.0	<0.001
Data presented are n (%), unless otherwise indicated *After review of patients flagged by NLP **Includes biopsy, diagnostic thoracentesis, and pathologic evaluation of surgical specimens			



Notes:

13. Norwood Palliation in High Risk Neonates With Hypoplastic Left Heart Syndrome

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Authors: *Vincent K. Tam, Lisa Roten, Eldad Erez, Vinod Sebastian, Hisashi Nikaidoh, *Phil Burch, James Kuo

Author Institution(s): *Cook Children's Medical Center, Fort Worth, TX*

Discussant: *Jorge D. Salazar, *Children's Hermann Memorial, Houston, TX*

Objectives: Some centers recommend a hybrid approach for newborn palliation consisting of branch pulmonary artery banding with or without ductal stenting. High risk criteria include small size, prematurity, genetic syndromes, pulmonary vein disease. We review our experience with these high risk newborns who had early Norwood palliation.

Methods: From January 2014 to December 2017, 56 newborns were admitted with HLHS, 72% prenatally diagnosed. All patients had Norwood palliation at age 5.6 days (1-27), weight 3.08 Kg (1.9 -4.3). 22 newborns were considered high risk. 11 babies weighed 2.5 Kg or less (1.9-2.5 Kg), 2 had obstructed TAPVC, 1 had absent aortic valve. 7 were followed prenatally for restrictive atrial septum and abnormal fetal pulmonary vein flow. One had Noonan Syndrome.

All pts had Norwood without circulatory arrest. 33 had modified BT shunt while 23 had RV to pa shunt. 2 pts had simultaneous repair of obstructed TAPVC.

Results: Hospital mortality for the entire group was 5.3% (3/56), with no interstage mortality. 2 of these 3 were supported with ECMO. For the entire group, there were 3 late mortalities and no transplant so far for a longer term survival of 89%, with a follow up of 4 to 52 months, with one lost to follow up. In the high risk group, hospital mortality was 0 with no interstage mortality. There is 1 late mortality and 1 biventricular repair. One patient with obstructed TAPVC had left pneumonectomy and currently awaiting Fontan. Pulmonary vein obstructive disease is responsible for 2 late mortalities and a continuing issue in 2 other children.

Conclusions: Excellent results are feasible with early Norwood even in this high risk group. Our results compare favorably to results with the Hybrid approach reported for the same time period in the STS database. These data argue against the use of a hybrid approach except in very unusual circumstances.

Notes:

14V Rheumatic Double Valve Repair Using Two Remodeling Annuloplasty Rings

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Authors: *Richard S. Downey[2], ***D****J.S. Rankin[1], Lawrence M. Wei[1], *Vinay Badhwar[1]
Commercial Relationships: *J.S. Rankin: Consultant/Advisory Board: BioStable Science and Engineering Inc., AtriCure

Author Institution(s): *[1]West Virginia University, Morgantown, WV; [2]University of Michigan, Muskegon, MI*

Discussant: *Tomas D. Martin, *University of Florida, Gainesville, FL*

Objectives: Cardiac valve repair is a recognized approach to achieve satisfactory long term valve function and improved survival over replacement. Concomitant aortic and mitral valve repair has been associated with excellent freedom from recurrent insufficiency or valve related complications. This video illustrates an operative approach of combined rheumatic mitral valve repair and aortic valve repair involving double remodeling ring annuloplasty.

Methods: A 70 year old man with NYHA Class 3 congestive heart failure was found to have Grade 3 aortic valve insufficiency, Grade 2-3 mitral insufficiency with mild mitral stenosis, and an ejection fraction of 35%. Transesophageal echocardiography showed a tri-leaflet aortic valve with rheumatic nodular retraction plus retraction and thickening of the posterior mitral leaflet with good mobility of the anterior leaflet.

Results: Surgical correction included pericardial patch augmentation of the posterior mitral leaflet using glutaraldehyde-fixed autologous pericardium and rigid ring annuloplasty. Nodular retraction and minor leaflet calcification of the aortic valve were addressed using ultrasonic debridement, followed by implantation of a 3-dimensional aortic annuloplasty ring to complete the repair. Post-operative transesophageal echocardiography revealed excellent hemodynamic freedom from valvular regurgitation or stenosis.

Conclusion: Mitral valve repair techniques are well developed and allow for successful reconstruction in selected patients with rheumatic valvular disease. The use of an aortic annuloplasty ring may provide a simple option for enhancing the reparability of rheumatic aortic valve insufficiency.

Notes:

*3:10 pm -3:23 pm
Magnolia Ballroom A-C

B-V1. VATS Resection for Extralobar Pulmonary Sequestration With a Large Aberrant Artery After Endoluminal Stenting and Plug Occlusion

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Authors: Gopal Singh, Bianca Bromberger, Richard Green, ***Joshua R. Sonett**

Author Institution(s): *New York Presbyterian/ Columbia University, New York, NY*

Moderator: *Garrett L. Walsh, *University of Texas, MD Anderson Cancer Center, Houston, TX*

Objectives: Pulmonary sequestration is a rare congenital lung malformation that more commonly occurs in the left lung, mainly near the lower mediastinum. It is rarely observed in adult patients. We present the case of a 57 year old male with a pulmonary sequestration with a abnormal large artery situated in the inferior pulmonary ligament. 24 hours before the resection this patient had endoluminal stenting (TEVAR) and plug occlusion to decompress the large aberrant artery.

Methods: This patient is a 57 year old male former 25 pack year smoker, with previous medical history of left bundle branch block and hypertension, and a left lower lobe pulmonary mass found incidentally in 2008 who presented evaluation of lung mass. In 2008, when left lower lobe mass was discovered, patient underwent CT guided biopsy, which returned negative for malignancy. This patient was followed for few years with routine CT scans. Recently he presented with a cough, intermittent fevers and night sweats. He underwent a CT angiogram (CTA) which showed that the mass had increased in size and was supplied by an abnormally large artery branching from the descending thoracic aorta.

Results: In anticipation of the planned resection this patient had distal plug occlusion of the aberrant artery and endoluminal stenting of the thoracic aorta to decompress the vessel. The next day he underwent a VATS resection of the sequestration along with the aberrant artery as narrated in this video. The resection and post-operative course of this patient was uncomplicated.

Conclusion: The use of endoluminal stents and plug occlusion is helpful in decompressing aberrant vessels allowing for safe resection. Pulmonary sequestration is a rare disease, and missed diagnosis and misdiagnosis are very common in these patients. CTA, 3 D reconstruction and other angiography techniques should be used when there is suspicion of such a condition.

**Please note: This break is scheduled from 3:00 pm-3:30 pm. These video abstract presentations will begin approximately ten minutes after the scheduled break time has begun to allow for attendees to transition from the general session rooms into the Exhibit Hall. *Actual presentation start times may vary. Each presentation is allotted eight minutes followed by another five minutes of discussion.*

Notes:

15. Acute Type A Dissection Repair: The Role of Individual Surgeon Experience Versus High Volume Center

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Commercial Relationships: *T.C. Nguyen: Speakers Bureau/Honoraria: Abbott, Edwards Lifesciences, LivaNova; *A.L. Estrera: Consultant/Advisory Board: Gore

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Objectives: Previous studies suggest improved outcomes when acute Type A aortic dissections (ATAAD) are repaired at high-volume centers. It is unclear, however, if improved outcomes are a result of individual surgeon experience or from inherent resources available at high-volume centers. To explore this question, we stratified outcomes from ATAAD repair by low and high-volume surgeons at a high-volume aortic center.

Methods: We reviewed our institutional experience with ATAAD between 1999-2016 (n=553). To evaluate surgeon experience with ATAAD repair, we categorized surgeons either as high volume (HVAS, 2 surgeons, cases ↗30) or low volume aortic surgeons (LVAS, 5 surgeons, cases <30) over the study period. We also evaluated the effect of surgeon role (i.e. primary surgeon vs. first assist). Analysis was stratified according to the following: HVAS in both primary and first assist roles, one HVAS with one LVAS, and LVAS in both primary and first assist roles.

Results: The total experience for HVAS and LVAS as primary surgeon for the study period was 476 and 62, respectively. Mean experience of HVAS was 238±32 and 12±11 cases for LVAS. 91% of procedures were performed with at least one HVAS; 9% with entirely LVAS. In-hospital mortality was 15% if a HVAS was present and 22% with all LVAS (p=0.31). After adjusting for preoperative factors, the odds-ratio for low-volume team mortality was 2.1 (p=0.047). Expected risk was for 30-day mortality was 16% in the HVAS population, and 13% in LVAS (p<0.02).

Conclusions: ATAAD repair by a low-volume aortic team had a two-fold mortality increase over a team with an experienced aortic surgeon. Improved outcomes seen at high-volume aortic valve centers may be predominantly due to surgeon experience and not from inherent resources available at high-volume centers. This study may also have implications on call coverage for ATAAD repair.

Variables according to team composition:

	HVAS Primary HVAS Assist (n = 149)	HVAS Primary LVAS Assist (n = 316)	LVAS Primary HVAS Assist (n = 14)	LVAS Primary LVAS Assist (n = 46)	p-value
Mean Age (mean, SD)	63.0±14.8	57.0±14.3	64.0±11.5	55.5±15.0	<0.001
Gender Male (n, %)	107 (71.8)	223 (70.6)	10 (71.4)	27 (58.7)	0.38
Atrial Fibrillation (n, %)	8 (5.8)	17 (5.8)	1 (7.7)	4 (8.9)	0.86
CAD (n, %)	31 (22.3)	32 (10.9)	1 (7.7)	3 (6.7)	0.01
COPD (n, %)	36 (26.3)	76 (25.9)	5 (38.5)	12 (27.3)	0.80
Stroke (n, %)	12 (8.6)	19 (6.5)	1 (7.7)	4 (9.1)	0.83
PVD (n, %)	21 (15.1)	19 (6.4)	1 (7.7)	3 (6.8)	0.03
Reoperation (n, %)	25 (18.0)	18 (6.1)	0 (0.0)	1 (2.2)	<0.001
Aortic Rupture (n, %)	32 (21.5)	41 (13.0)	2 (14.3)	3 (6.5)	0.04

HVAS: High Volume Aortic Surgeon; LVAS: Low Volume Aortic Surgeon; CAD: Coronary Artery Disease, COPD: Chronic Obstructive Pulmonary Disease, PVD: Peripheral Vascular Disease.

Notes:

16. Surgical Risk Functional Outcomes and Long Term Survival After Lung Volume Reduction Surgery: A 13 Year 119 Patient Single Center Experience

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Discussant: *Stephen R. Hazelrigg, *Southern Illinois University, Springfield, IL*

Objectives: Lung volume reduction surgery (LVRS) was developed as a means of surgical treatment for severe pulmonary emphysema. The National Emphysema Treatment Trial (NETT) validated the efficacy of LVRS in selected patients with emphysema. There continue to be concerns about the safety and resilience of the operation which have limited its clinical application. In this study we describe our continued experience since the close of the NETT trial reporting on the safety, efficacy, and long term survival of LVRS at a single center.

Methods: Retrospective analysis of 119 patients on whom bilateral LVRS was performed at our institution between 1/2004 and 1/2017. Primary outcomes analyzed were 6-month surgical mortality and overall survival at 1, 2, and 3 years.

Results: Two patients were limited to a unilateral procedure. Of the 117 bilateral procedures performed, 82% were VATS. Pre-operative characteristics: Mean age: 64, FEV1 - % of predicted: 26.26, RV % of predicted: 210.57, DLCO2 % of predicted: 29.12, Mean maximal workload (W) 38.81. Surgical results: surgical mortality (6-month) 0.84 %, Length of hospital stay (median): 8 days. Complications: prolonged air leak: 65 (54.62%), pneumonia 7(5.88%), respiratory failure 4 (3.36%), re-operation 3 (2.67%).The 1, 2, and 5-year survival was 99%, 96% and 80%. Functional result was evaluated for 85 patients (1 year, mean change from baseline) FEV1 change in % of value 10.96, DLCO % of predicted value 5.02, maximal workload (W) 11.94.

Conclusions: Results from our center following NETT criteria demonstrate that patients treated by multidisciplinary team consisting of pulmonologists, nurses and experienced surgeons LVRS carries a negligible mortality risk and can be performed routinely with minimally invasive techniques. Early functional measurements are consistent with significant clinical benefit. LVRS continues to represent the standard for lung-volume reduction therapy.

Notes:

17. Readmission Following Pediatric Cardiothoracic Surgery: An Analysis of The Society of Thoracic Surgeons Congenital Heart Surgery Database

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Objectives: Pediatric patients are often readmitted following cardiac surgery. To determine prevalence, describe patient characteristics, and evaluate risk factors, we analyzed the Society of Thoracic Surgeons Congenital Heart Surgery database (STS-CHSD).

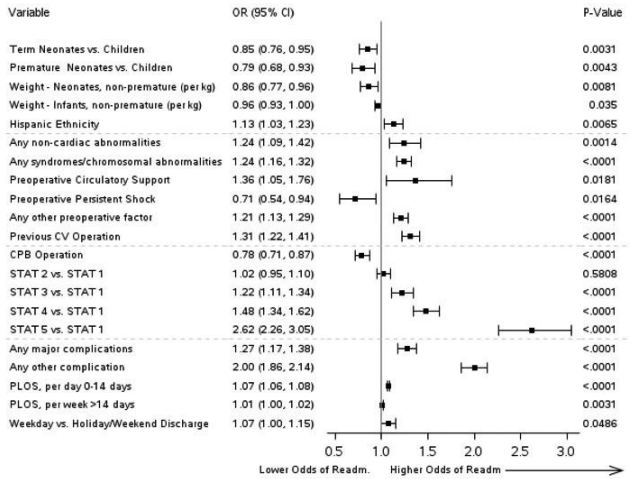
Methods: Readmission was based on the "readmission within 30 days after discharge" field. Ultimately, 56,429 patient records from 100 centers were included in the analysis. Numerous variables were evaluated, comparisons were made between readmission and non-readmission groups, and unadjusted and adjusted risk factor analyses were performed.

Results: Overall, 6,208 of 56,429 (11%) patients were readmitted.

The most common reasons for readmission were respiratory/airway complications (14.2%), septic/infectious complications (11.4%), and reasons not related to the surgical procedure (20.2%). Reason varied by benchmark operation group.

In the adjusted model, factors associated with increased odds of readmission included non-cardiac abnormalities (OR = 1.24, p = 0.0014), chromosomal abnormalities and/or genetic syndromes (OR = 1.24, p <0.0001), preoperative mechanical circulatory support (OR = 1.36, p = 0.0181), other preoperative factors (OR = 1.21, p <0.0001), previous CV operations (OR = 1.31, p<0.0001), Hispanic ethnicity (OR = 1.13, p = 0.0065), post-operative length of stay (OR = 1.07 per day 0-14 days, p <0.0001; OR = 1.01 per week >14 days, p = 0.0031), any major complication (OR = 1.27, p <0.0001), any other complication (OR = 2.00, p <0.0001), and being discharged on a weekday (OR = 1.07, p = 0.0486). Higher procedural complexity (higher STAT level vs. STAT 1) was also associated with increased odds of readmission: STAT level 3 (OR = 1.22, p<0.0001), 4 (OR = 1.48, p<0.0001), and 5 (OR = 2.62, p<0.0001).

Conclusions: Rates and risk factors for readmission have been identified. Hopefully, process improvements can minimize the impact of avoidable hospital readmissions following congenital heart surgery.



Significant factors in the adjusted analysis

Notes:

18. Current Outcomes With Isolated Surgical Mitral Valve Replacement: A Benchmark for Transcatheter Mitral Valve Replacement Technologies

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Commercial Relationships: *A.M. Speir: Consultant/Advisory Board: Medtronic; *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

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Discussant: *Steven F. Bolling, *University of Michigan Hospital, Ann Arbor, MI*

Objectives: Several clinical trials are underway to evaluate the safety and efficacy of transcatheter mitral valve replacement (tMVR) in intermediate and high surgical risk patients. In order to provide a benchmark with which to compare these emerging procedures we analyzed outcomes of surgical mitral valve replacement (MVR) in a statewide consortium over 16 years.

Methods: All patients undergoing isolated MVR from 2000 to 2017 at 19 cardiac surgery centers were stratified by Predicted Risk of Mortality (PROM) into low (<4%), moderate (4-8%), and high (>8%) risk cohorts. Patients with endocarditis were excluded since tMVR is not feasible. Outcomes including mortality and morbidity were evaluated for each cohort. Baseline characteristics, postoperative events, mortality, and resource utilization were compared using univariate analysis.

Results: A total of 1,611 patients met inclusion criteria. There were 927 (57.6%) low, 370 (22.9%) moderate, and 314 (19.5%) high risk patients. The median PROM for each group was 1.9%, 5.5%, and 12.4%. Operative mortality was lower than expected for all 3 groups and the most common complications were prolonged ventilation, reoperation, and renal failure (**table**). Not surprisingly, higher risk patients were more likely to have longer ICU and hospital lengths of stay (2 vs 3 vs 5 days, p<0.0001 and 7 vs 8 vs 10 days, p<0.0001) and total hospital costs were significantly different between the risk groups with the highest risk group expectedly incurring the greatest costs ($38,029 vs $45,075 vs $59,171, p<0.0001).

Conclusions: Surgical MVR is a safe and economical option for all patients who require mitral valve replacement. These outstanding outcomes serve as a high benchmark for transcatheter mitral valve replacement technologies.

Outcomes for patients undergoing surgical mitral valve replacement stratified by Predicted Risk of Mortality

	Low Risk	Moderate Risk	High Risk	p-value
N	927	340	314	
O:E Mortality	0.80	0.82	0.95	
Permanent stroke	13 (1.4%)	10 (2.7%)	16 (5.1%)	0.0011
Pneumonia	26 (2.8%)	13 (3.5%)	30 (9.6%)	<0.0001
Prolonged ventilation	99 (10.7%)	74 (20.0%)	111 (35.4%)	<0.0001
Renal Failure	33 (3.6%)	19 (5.1%)	41 (13.1%)	<0.0001
Reoperation	68 (7.3%)	36 (9.7%)	48 (15.3%)	0.0002

Notes:

19. A Minimally Invasive Approach to Lobectomy After Induction Therapy Does Not Compromise Survival: A National Analysis

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Discussant: *Stephen C. Yang, *Johns Hopkins Hospital, Baltimore, MD*

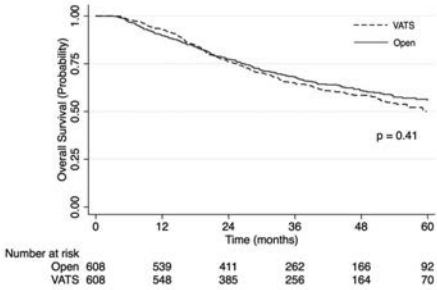
Objectives: The feasibility and efficacy of a video-assisted thoracoscopic surgical (VATS) approach to lobectomy for early-stage non-small cell lung cancer (NSCLC) has been well-studied, but the use of VATS for more locally advanced NSCLC is not as well characterized. The objective of this study was to evaluate the impact of a VATS approach on short- and long-term outcomes in patients who underwent lobectomy after induction therapy.

Methods: Perioperative outcomes and long-term survival of all patients with NSCLC who received induction chemotherapy (with or without concurrent induction radiation therapy) followed by lobectomy in the National Cancer Data Base (NCDB) from 2010-2014 were assessed using Kaplan–Meier, propensity score-matched, and multivariable Cox proportional hazards analyses.

Results: In the NCDB, 2,771 lobectomy patients met inclusion criteria (VATS 637 [23%], Thoracotomy 2,134 [77%]). Of the VATS cases, 147 (23%) were converted to thoracotomy. Compared to an open approach, VATS was associated with decreased length of stay (LOS) (median: 5 days vs 6 days, $P < 0.001$) and no significant differences in 30-day mortality (VATS [1% (n=9)] vs open [3% (n=54)]; $P = 0.07$), 90-day mortality (VATS [4% (n=23)] vs open [6% (n=118)]; $P=0.12$), and unplanned readmission (VATS [3% (n=21)] vs open [4% (n=95)]; $P = 0.21$). There were no significant differences in 5-year survival between the VATS and open groups in both the entire cohort (VATS [50%] vs open [53%]; $P=0.99$) and in a propensity score-matched analysis of 1216 patients (**Figure**); furthermore, a VATS approach was also not associated with worse survival in multivariable analysis (HR = 0.99; 95% CI [0.85, 1.15]; $P = 0.90$).

Conclusions: This national analysis shows that a VATS approach can be used for lobectomy in patients who received induction therapy for locally advanced NSCLC without compromising short-term or long-term outcomes.

Figure 1: Overall survival stratified by surgical approach: propensity score-matched analysis



Notes:

20. Vascular Rings in Adults: Outcome of Surgical Management

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Discussant: *Constantine Mavroudis, *Florida Hospital for Children, Orlando, FL*

Objectives: Limited data exists on the management of vascular rings (VR) in adults. We reviewed a single institution's experience of surgical treatment of these patients.

Methods: All adult patients with VR (n=65) that underwent surgery [mean age 45±16 yr, 33(51%) females] were retrospectively reviewed from 1/1972 to 1/2018. Anatomic variants were: right arch with aberrant left subclavian artery (SA) and Kommerell's diverticulum (KD) (n= 24;37%), left arch with aberrant right SA and KD(n=21, 32%), double aortic arch (n=12, 18%), right arch with mirror imaging and persistent ligamentum (PL) off the KD (n=7;11%), and other(n=9, 14%). Indications for operation included dysphagia (n=43), respiratory symptoms (n=28), aneurysmal KD (n=12) and dissection/rupture (n=7).

Results: VR repair included division of PL (n=32, 49%), oversewing of KD (n=20, 31%), excision of KD with graft reconstruction (n=12, 18%) and division of non-dominant arch (n=11, 17%). Approach was left thoracotomy (n=50, 77%), right thoracotomy (n=7, 11%), sternotomy (n=5, 8%) and hybrid repair (n=3, 5%). A 2-stage repair with carotid-SA transposition followed by transthoracic KD excision was done in 51% of aberrant SA (n=23). VR repair was a redo in 18 pt (28%). There was 1 early death. Morbidity included recurrent laryngeal nerve injury in 5 pt and chylothorax in 3. Symptomatic improvement occurred in 97%. Median survival was 17 yr. Survival at 5, 10, and 15 yr was 85%, 73% and 64%, respectively. Dysphagia recurred in 9(14%); 2 had residual compression requiring re-repair and 7 had esophageal dysmotility.

Conclusions: Repair of VR in adults can be performed safely. Dysphagia is the most common symptom and improves in the majority after repair. Excision of KD and aberrant vessel is the preferred approach to prevent acute aortic events or recurrent symptoms. Early operation should be considered with esophageal compression to avoid late dysmotility.

Notes:

21. CT-Guided Percutaneous Radiotracer Localization and Resection of Indistinct or Small Pulmonary Lesions

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Objectives: Detection of small or indistinct pulmonary lesions has increased and often they are difficult to localize and resect intraoperatively. We present our experience with preoperative computer-tomography (CT)-guided radiotracer localization followed by immediate resection of these pulmonary lesions.

Methods: Patients with ill-defined pulmonary nodule or smaller than 1 cm and/or deep below the visceral pleura underwent CT-guided injection of radiotracer technetium99m macroaggregates (99mTc-MAA) close to the lesion. During intervention, we used a handheld gamma probe to localize the marked pulmonary area. This area was resected by VATS and the specimen evaluated by a frozen section. In case of primary lung cancer, a lobectomy with lymph node dissection was performed.

Results: From November 2007 to December 2017, 262 patients (196 men; median age 63 years) underwent preoperative radiotracer injection with a successful marking in all patients. Localization complications included 25 (9.5%) asymptomatic pneumothoraces, 36 (13.7%) parenchymal hemorrhage soffusions, and 2 (0.7%) mild allergic reaction to contrast medium. In all cases, except for 3, the gamma probe revealed the pulmonary lesion. Mean distance from the pleura was 10 mm (range, 0 to 40 mm). Pulmonary resection was performed by thoracoscopy in 212 (80.9%) cases, intentional thoracotomy in 42 (16.0%), and converted thoracoscopy to thoracotomy in 8 (3.1%). Mean pathological nodule size was 9.3 mm (range, 2-25 mm). 166 (63.4%) nodules were nonsolid, 64 (24.4%) were partially solid, and 32 (12.2%) had a solid morphology. Histology showed 16 (6.1%) benign lesions and 246 (93.9%) malignant lesions (218 primary lung cancers, and 28 metastases).

Conclusions: Preoperative radiotracer localization of small or indistinct pulmonary lesions is simple and feasible with a high rate of success. This technique may become an effective and attractive alternative in managing ill-defined or small pulmonary lesions.

Notes:

22. Recent Antiplatelet Therapy Does Not Affect Short Term Outcomes Following Non-CABG Cardiac Surgery

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Discussant: Mario F.L. Gaudino, *Weill Cornell Medicine, New York, NY*

Objectives: While the safety of coronary artery bypass grafting (CABG) with recent antiplatelet therapy has been evaluated, there is a paucity of data on patients undergoing non-CABG cardiac surgery. This study aims to evaluate the effect of antiplatelet therapy within five days of non-CABG cardiac surgery on postoperative outcomes.

Methods: The Maryland Cardiac Surgery Quality Initiative database was used to identify all patients undergoing non-CABG cardiac surgery from July, 2011 to December, 2016 across ten centers in Maryland. Propensity score matching was used to control for confounding variables including age, gender, race, body mass index (BMI), tobacco use, diabetes, preoperative estimated glomerular filtration rate (eGFR), type of surgery, urgency of the surgery, and re-operative surgery. Cox survival analysis was performed to analyze thirty-day mortality.

Results: 9,611 patients undergoing non-CABG cardiac surgery were identified. A total of 974 patients were exposed to a non-aspirin antiplatelet agent within five days of surgery. Prior to propensity score matching, patients exposed to antiplatelet agents within five days of surgery were more likely to be older (72.5 vs 61.5 $p<0.001$), have diabetes (38.8% vs 22.5% $p<0.001$), be on dialysis (4.3% vs 3.1% $p=0.04$), have hypertension (87.2% vs 66.2%, $p<0.001$), have peripheral arterial disease (16.7% vs 6.0% $p<0.001$), and be undergoing a reoperation (37.5% vs 22.3% $p<0.001$). Propensity matching yielded 642 well-matched pairs. Thirty day survival was similar in the matched samples. No significant differences were observed in the secondary outcomes including reoperation for bleeding, blood products transfused, postoperative stroke, and readmission within 30 days of discharge.

Conclusions: Exposure to antiplatelet therapy within five days of non-CABG cardiac surgery does not increase thirty day mortality or morbidity and should not prohibit or delay surgery in urgent or emergent situations.

Notes:

23. Does Mitral Valve Repair Restore Normal Life Expectancy?

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Discussant: ***D****W. Randolph Chitwood, Jr., *Vidant Medical Center and East Carolina University, Greenville, NC*

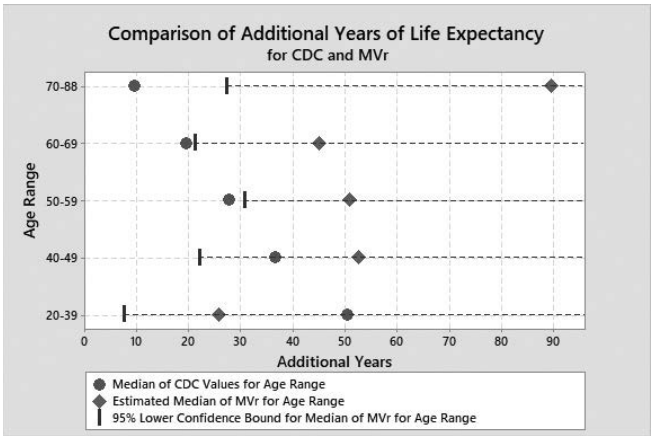
Commercial Relationships: *W.R. Chitwood, Jr.: Consultant/Advisory Board: NeoChord, Inc., Scanlan International

Objectives: Repair of mitral regurgitation (MR) for degenerative disease is the gold standard, as medical management carries a poor prognosis. Early mitral valve repair (MVr) in asymptomatic MR may even be "restorative" to expected survival. However, despite the clear benefit of MVr, many eligible patients are untreated. This study aims to determine if MVr restores patients to normal life expectancy, at any age of operation, by comparing long-term survival of a post MVr cohort to the CDC national life expectancy.

Methods: This retrospective study investigated 1011 patients with degenerative MR who underwent isolated MVr between 2003 and 2017. Patients with atrial fibrillation or who had MAZE, AVR, TVR, or CABG were excluded. Anderson Darling goodness of fit tests were used to compare life expectancy post MVr to the predicted CDC life expectancy. A Weibull probability plot was applied to best fit lines. MVr patients were categorized by age into decade (range 20-89 years). Decades 4, 5, and 6 were composed of ages 40-49, 50-59, and 60-69 years (206, 272, 254 respectively). Decades 2-3 and 7-8 were combined due to small sample size (103 and 176 respectively).

Results: The life expectancy of MVr patients was non-inferior and matched the average life expectancy at any age between 40-89. The lower-bound one-sided 95% confidence intervals for additional life expectancy were not significantly different from corresponding average life expectancy. In the 20-39 year range there have been very few deaths (3), limiting predictability but survival also appears to be normative.

Conclusions: These findings suggest that MVr restores anticipated life expectancy to that of the general population, regardless of age at operation. Larger studies with longer-term follow-up are needed to enhance this finding, particularly for the younger age group, but our findings underscore the importance of repair in degenerative mitral disease.


Comparison of Additional Years of Life Expectancy
for CDC and MVr
70-88
60-69
50-59
40-49
20-39
Age Range
0
10
20
30
40
50
60
70
80
90
Additional Years
Median of CDC Values for Age Range
Estimated Median of MVr for Age Range
95% Lower Confidence Bound for Median of MVr for Age Range

Notes:

24. Clinical Outcomes of Surgical Unroofing of Myocardial Bridging in Symptomatic Patients

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Author Institution(s): *Mayo Clinic, Rochester, MN*

Objectives: There is a paucity of data regarding results of surgical management of myocardial bridging. Our objective was to evaluate the clinical outcomes of unroofing procedures in patients with myocardial bridging of the left anterior descending coronary artery (LAD) who had chest pain refractory to medical therapy.

Methods: Among 274 adults with myocardial bridging at a single institution (1996-2017), 71 underwent surgical intervention. After excluding patients with concomitant operations and/or clinically significant coronary disease, we identified 35 patients with preoperative chest pain and LAD bridging who underwent surgical unroofing. We analyzed symptomatic outcomes, medication use, and coronary endothelial function studies.

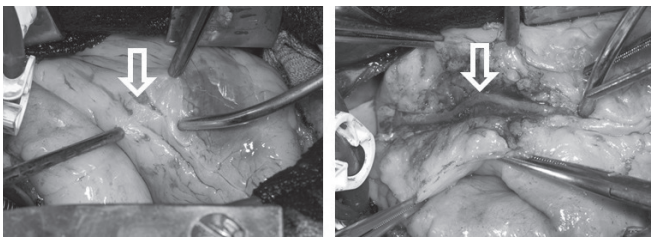
Results: Mean age was 48.2±11.2 years (18 male, 51%). All underwent preoperative coronary angiography and 24 (69%) had endothelial function studies. Endothelial dysfunction in the bridged LAD segment was seen in 20/24 (83%) patients. Mean bridge length was 3.8±1.6 cm and typically involved the mid-LAD (29/35, 83%). Mean cardiopulmonary bypass and cross-clamp times were 47.6±29.8 min and 33.7±22.2 min, respectively. Four patients had LAD bypass after unroofing based on intraoperative findings. Median lengths of hospital and ICU stay were 5 days and 1 day, respectively. Patients were stratified by follow-up duration (see **Table 1**; median 31 months, 95% confidence interval 18-49, maximum 145). There were no early or cardiac-related deaths and overall, 22 patients (63%) reported no chest pain. Of the 13 symptomatic patients, 10 underwent postoperative non-invasive testing that was negative for ischemia in all cases.

Conclusions: Myocardial unroofing is a safe, appropriate option in symptomatic patients with isolated LAD bridging. However, patients may need continued medical therapy for persistent chest pain despite relief of coronary compression. Additional studies are required to determine the etiology of this non-ischemic chest pain.

Table 1: Postoperative Outcomes Stratified by Follow-up

Variable	Follow-Up Duration								
	<6 Months			6 Months - 3 Years			>3 Years		
	Preop	Postop	P	Preop	Postop	P	Preop	Postop	P
Chest Pain (n=35)	14 (100%)	3 (21%)	0.003*	11 (100%)	4 (36%)	0.024*	10 (100%)	6 (60%)	0.137
Medication (n=33)									
Nitrates	7 (58%)	5 (42%)	0.952	6 (55%)	4 (36%)	0.952	7 (70%)	4 (40%)	0.250
Calcium Channel Blocker	4 (33%)	4 (33%)	0.999	7 (64%)	4 (36%)	0.250	2 (20%)	3 (30%)	0.999
Beta Blocker	3 (25%)	5 (42%)	0.472	4 (36%)	3 (27%)	0.952	4 (40%)	2 (20%)	0.472
L-Arginine	0 (0%)	1 (8%)	0.952	7 (64%)	1 (9%)	0.043*	4 (40%)	3 (30%)	0.952

Table 1 - Postoperative outcomes of chest pain (persistent or recurrent) and medication use (by medication class) stratified by short-, mid-, and long-term follow-up duration. There are significant decreases in chest pain in the short- and mid-term groups after unroofing but not in the long-term group. There are no significant changes in medication use except L-arginine use decreased in the mid-term group. *P-values < 0.05 deemed significant (Bonferroni-adjusted P-value from McNemar's test for paired proportions).



Intraoperative Images- Left: mid-LAD with overlying myocardial bridge before unroofing (arrow); Right: LAD now exposed following unroofing with complete resection of overlying myocardial bridge (arrow).

Notes:

25. Rate of Aortic Annular Enlargement Increasing in the Current TAVR Era

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Authors: *Robert B. Hawkins[1], Jared P. Beller[1], *James H. Mehaffey[1], Eric J. Charles[1], Mohammed Quader[3], *Andy Kiser[2], Mark Joseph[4], *Jeffrey B. Rich[5], ***D***Alan M. Speir[6], ***D***Gorav Ailawadi[1]
Commercial Relationships: *A.M. Speir: Consultant/Advisory Board: Medtronic; *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

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Discussant: *Michael J. Reardon, *Methodist DeBaket Heart & Vascular Center, Houston, TX*

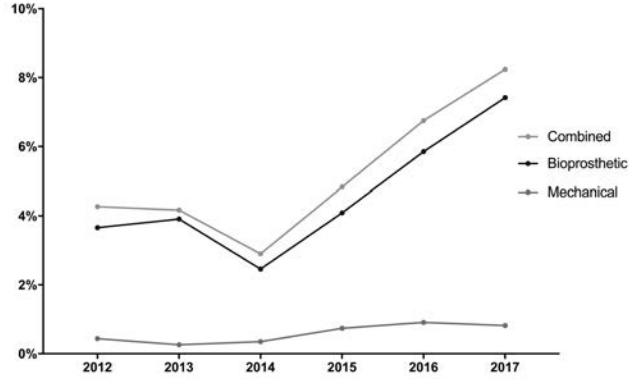
Objectives: With approval of transcatheter valve-in-valve (ViV) aortic valve replacement (AVR), we hypothesized that surgeons are implanting more ViV capable aortic valves (↗23mm), and that the number of annular enlargement procedures is increasing to accommodate these larger valve prostheses.

Methods: A total of 6,256 patients undergoing aortic valve replacement with or without coronary artery bypass grafting or mitral valve replacement from 2012-2017 were extracted from a regional Society of Thoracic Surgeons database. Patients were stratified by annular enlargement and era, pre-ViV (2012-2014) versus ViV (2015-2017), and compared. Effective orifice area was calculated for the 6 most common bioprosthetic valves.

Results: A total of 310 (5.0%) patients underwent an annular enlargement procedure. These patients were younger, more commonly female, but similar comorbidity rates. The rate of enlargement increased over time from 3.8% pre-ViV to 6.4% ViV (p<0.0001), with the volume driven by bioprosthetic valves (**Figure**), with a 3.9% increase in combined AVR cases but only 1.8% increase in isolated AVR cases. The rate of ViV capable valves (bioprosthetic ↗23mm) significantly increased (60% vs 67%, p<0.0001), with a higher increase for annular enlargement patients +12% vs +7%. Annular enlargement patients now have larger mean valve size (22.2 pre-ViV vs 23.0 ViV, p=0.0007), with higher mean effective orifice area (1.85 vs 2.02, p=0.0002). While body surface area did not significantly change (1.96 vs 2.02, p=0.28), effective orifice area indices also increased (1.03 vs 0.94, p=0.002).

Conclusions: Rates of annular enlargement and implantation of ViV capable prostheses are increasing in conjunction with availability of ViV technology. Annular enlargement patients are now receiving larger valves with higher mean effective orifice area indices. These results are encouraging for potential ViV treatment should replacement be required.

Percent of Aortic Valve Replacement Cases Undergoing Annular Enlargement



Notes:

26. Microplegia is a Safe, Effective, and Economical Alternative to Modified Buckberg Cardioplegia for Complex Cardiac Operations: A Propensity Matched Study

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Authors: Robert Borden, Clifford Ball, Pat Grady, Andrew Toth, Cheryl Lober, *Faisal G. Bakaeen, ***D***Michael Z. Tong, Eugene Blackstone, Eric E. Roselli
Commercial Relationships: M.Z. Tong: Consultant/Advisory Board: Abbott, ABIOMED

Author Institution(s): *Cleveland Clinic, Cleveland, OH*

Discussant: *Robert A. Guyton, *Emory University, Atlanta, GA*

Objectives: Microplegia (MC) has been studied during isolated coronary (CABG) or valve surgery, but not with more complex operations. Objectives are to demonstrate safety and efficacy of intermittent cold blood microplegia relative to standard cardioplegia during complex operations.

Methods: From January 2012 to May 2017, 242 patients underwent multi-component operations with MC delivered via syringe pump and 10,512 with modified Buckberg cardioplegia (BC). Outcomes were compared between 226 propensity-matched pairs using 44 preoperative variables.

Results: MC patients were more likely to undergo aortic arch repair with circulatory arrest (47% 107/226 MC vs 33% 75/226 BC, p=0.002) and longer operations (cardiopulmonary bypass: 182±59min MC vs 125±65min BC, p<0.0001; cross-clamp: 132±49min MC vs 88±51min BC, p<0.0001). Operations included replacement of the aortic root, arch or ascending aorta 94% (424/452), aortic valve operations 72% (324/452), and CABG 10% (47/452). There was no difference in hospital mortality (2.7% 6/226 MC vs 2.2% 5/226 BC, p=0.76), stroke (2.2% 5/226 MC vs 3.6% 8/225 BC, p=0.39), renal failure(8% 18/226 MC vs 5.8% 13/226 BC, p=0.35), prolonged ventilation (23% 51/226 MC vs 24% 54/226 BC, p=0.74), length of stay (11.2±9.0 days MC vs 10.8±9.2 days BC, p=0.97), or red cell units given among patients requiring transfusion(5.6±6.3 units MC vs 5.2±7.0 units BC, p=0.14). Troponin was higher for MC (15/50/85th percentiles: 0.37/0.71/1.79ng/mL MC vs 0.18/0.49/1.38ng/mL BC, p<0.0001), MC patients received less volume of cardioplegia (mean 27±8mL/operation MC vs 735±357mL/operation BC, p<0.0001) and had lower peak intraoperative glucose (196±40mg/dL MC vs 248±69mg/dL BC, p<.0001). Mean cost of cardioplegia per case was also less for MC vs BC at a ratio of 1 to 41.

Conclusions: Microplegia is a safe, effective and economical alternative to modified Buckberg cardioplegia during complex operations requiring extended bypass and cross-clamp time.

Notes:

27. Less-Invasive Aortic Valve Replacement: Trends and Outcomes from The Society of Thoracic Surgeons Adult Cardiac Surgery Database

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Authors: Mehrdad Ghoreishi[1], Raveendra Morchi[2], Malek Massad[3], Morgan L. Cox[4], Samarth Durgam[3], Maria Grau-Sepulveda[4], Aditya Mantha[2], Chetan Pasrija[1], Luis Vargas[4], Alessio Pigazzi[2],* Bartley P. Griffith[1], *Jeffrey P. Jacobs[5], ***D***Vinod H. Thourani[8], *Vinay Badhwar[9], ***D***James S. Gammie[1], Lars G. Svensson[7], Khaled Abdelhady[3], Jeffrey C. Milliken[2], Zachary Kon[6]
Commercial Relationships: *V.H. Thourani: Consultant/Advisory Board: Abbott Vascular, Boston Scientific, Claret Medical, Cryolife, Edwards Lifesciences, Gore Vascular, Jena Valve; *J.S. Gammie: Consultant/Advisory Board: Edwards Lifesciences

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Objectives: This study compares outcomes of conventional and less-invasive approaches to aortic valve replacement (AVR) using the STS Adult Cardiac Surgical Database (STS ACSD).

Methods: Between 2011 and 2016, 122,474 patients undergoing isolated primary AVR were identified in the STS ACSD. Patients were categorized into 3 groups: 1)full sternotomy (FS)(N=98,549,78%), 2)partial sternotomy (PS)(N =17,306,15%), and 3) right thoracotomy (RT)(N =6,619,7%).

Results: The rate of less-invasive AVR increased from 17% in 2011 to 23% in 2016 (P < 0.0001). Femoral cannulation was utilized in 1.5% of FS, 5.4% of PS, and 71% of RT(P<0.001). FS patients were older, had more preoperative comorbidities including higher rates of renal failure, a-fib, stroke, NYHA function class, STS mortality score and lower EF (**Table 1**). Total operative, CPB and cross clamp time were longest in RT approach, and shortest in the FS group. Operative mortality was 1.9% and was not different between the 3 groups (1.97%FS,1.77%PS,1.90%RT,P=0.4). The rate of post-operative stroke was 1.2% and was not different between the 3 groups (**Table 1**). After risk adjustment, these differences remained non-significant. Femoral arterial cannulation was not found to be a significant risk factor for postoperative stroke. Femoral arterial cannulation was found to be only a risk factor for operative mortality among FS patients (OR=1.88,CI=1.39–2.56,P=0.03). After risk adjustment, prolonged ventilation and A-fib were less common in the PS group and blood transfusion and renal failure were lower in the RT group (**Table 2**).

Conclusions: Less-invasive AVR is associated with a similar operative mortality and postoperative stroke rate compared to full sternotomy. Femoral arterial cannulation does not increase the risk of stroke following less – invasive AVR. In the absence of long-term outcomes and quality of life, the 30 – day outcome of less invasive AVR appears non – inferior to full sternotomy AVR.

Table 1: Preoperative characteristics and postoperative outcomes of patients undergoing conventional AVR vs. less - invasive AVR

Variable	Overall (N=122474)	Full Sternotomy (N=98549)	Partial Sternotomy (N=17306)	Right Thoracotomy (N=6619)	p-value
Preoperative Characteristics					
Age (mean, SD)	68.68 ± 11.65	68.64 ± 11.61	68.61 ± 11.87	69.49 ± 11.69	< 0.0001
Age >= 80 years % (N)	18.33 (22450)	18.11 (17851)	18.67 (3231)	20.67 (1368)	< 0.0001
Female % (N)	42.17 (51642)	42.53 (41916)	40.87 (7073)	40.08 (2653)	< 0.001
Dialysis dependent % (N)	1.63 (1995)	1.74 (1711)	1.23 (213)	1.07 (71)	< 0.001
Chronic stroke % (N)	5.31 (6508)	5.39 (5309)	4.80 (830)	5.57 (369)	0.01
Severe lung disease % (N)	3.60 (4404)	3.83 (3772)	2.50 (432)	3.02 (200)	< 0.001
Peripheral vascular disease % (N)	7.97 (9766)	8.07 (7948)	7.42 (1284)	8.07 (534)	0.01
Previous MI % (N)	8.61 (10545)	8.78 (8657)	7.38 (1277)	9.23 (611)	< 0.001
Atrial fibrillation % (N)	13.76 (16851)	14.65 (14440)	9.05 (1567)	12.75 (844)	< 0.001
EF (mean, SD)	57.57 ± 11.29	57.22 ± 11.59	59.36 ± 9.73	58.11 ± 10.10	< 0.001
EF < 50% % (N)	14.43 (17667)	15.39 (15167)	9.88 (1711)	11.92 (789)	< 0.001
NYHA (Class III / IV) % (N)	56.89 (27191)	58.33 (22785)	50.69 (3269)	49.73 (1137)	< 0.001
STS mortality risk score (mean, SD) Low risk (<4%) Moderate risk (4 – 8%) High risk (> 8%)	2.35 ± 2.28 87% (106096) 11% (13127) 2% (3251)	2.40 ± 2.33 86% (84760) 11% (10989) 3% (2800)	2.11 ± 2.03 89% (15516) 9% (1486) 2% (304)	2.24 ± 2.08 88% (5820) 10% (652) 2% (147)	< 0.001
Operative Characteristics					
Status (Urgent) % (N)	16.54 (20252)	17.83 (17567)	10.38 (1796)	13.43 (889)	<. 0001
Total Operative Time (min) (Median, IQR)	188 (157 – 226)	186 (155 – 223)	197 (165 – 236)	205 (170 – 252)	<.0001
Perfusion Time (min) (Median, IQR)	94 (75 – 117)	93 (75 – 115)	95 (77 – 117)	106 (85 – 136)	<.0001
Cross-Clamp Time (min) (Median, IQR)	71 (57 – 88)	70 (56 – 87)	72 (58 – 89)	78 (63 – 98)	<.0001
Intraoperative Blood Product Transfusion % (N)	31.04 (38021)	31.84 (31377)	28.76 (4977)	25.19 (1667)	<.0001
Postoperative Outcomes					
Operative Mortality % (N)	1.94(2372)	1.97 (1939)	1.77 (307)	1.90 (126)	0.4311
Operative mortality by STS mortality risk score (%, N) Low risk (< 4%) Moderate risk (4 – 8%) High risk (> 8%)	 1.44 (1529) 4.39 (576) 8.21 (267)	 1.42 (1207) 4.60 (505) 8.11 (227)	 1.44 (224) 3.57 (53) 9.87 (30)	 1.68 (98) 2.76 (18) 6.80 (10)	 0.09 0.07 0.51
Permanent Stroke % (N)	1.21 (1477)	1.19 (1177)	1.31 (227)	1.10 (73)	0.3126
Reoperation for bleeding, % (N)	3.53 (4328)	3.52 (3473)	3.66 (633)	3.35 (222)	0.4857
Prolonged ventilation % (N)	6.71 (8223)	6.98 (6880)	5.45 (943)	6.04 (400)	<.0001
New Renal Failure % (N)	1.89 (2272)	1.99 (1919)	1.54 (263)	1.38 (90)	<. 0001
Deep sternal wound infection % (N)	0.16 (193)	0.16 (154)	0.21 (36)	0.05 (3)	0.0172
Postoperative Blood product transfusion % (N)	31.65 (38759)	32.53 (32061)	29.80 (5158)	23.27 (1540)	<.0001
Postoperative LOS, days	6 (5 – 8)	6 (5 – 8)	6 (4 – 7)	5 (4 – 7)	<.0001

Table 2: Adjusted analysis of postoperative mortality and morbidities between less - invasive AVR and full sternotomy AVR

Binary Outcomes	Adjusted OR (95% CI) (Full sternotomy as reference)	P
Operative Mortality		
Partial Sternotomy	1.04 (0.90 – 1.19)	0.6152
Right Thoracotomy	0.89 (0.64 – 1.24)	0.4931
Permanent Stroke		
Partial Sternotomy	1.12 (0.96 – 1.31)	0.1356
Right Thoracotomy	0.79 (0.57 – 1.10)	0.1671
Prolonged Ventilation		
Partial Sternotomy	0.90 (0.81-0.99)	0.0300
Right Thoracotomy	0.94 (0.78-1.12)	0.4820
New Renal Failure		
Partial Sternotomy	0.92 (0.78 – 1.08)	0.2924
Right Thoracotomy	0.67 (0.51 – 0.87)	0.0025
Transfusion RBC		
Partial Sternotomy	0.93 (0.82 – 1.05)	0.2456
Right Thoracotomy	0.60 (0.51 – 0.70)	<.0001
Post-Operative AFib		
Partial Sternotomy	1.07 (1.01 – 1.14)	0.0241
Right Thoracotomy	0.94 (0.85 – 1.03)	0.1994
Post-operative LOS < 6 days		
Partial Sternotomy	1.04 (0.95 – 1.14)	0.3677

28V. Apical Myectomy for Nonobstructive Hypertrophic Cardiomyopathy

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Authors: Anita Nguyen, *Hartzell Schaff

Author Institution(s): *Mayo Clinic, Rochester, MN*

Discussant: Nicholas Smedira, *Cleveland Clinic, Cleveland, OH*

Objectives: We present a video of transventricular apical myectomy in a patient with nonobstructive hypertrophic cardiomyopathy (HCM).

Methods: A 20-year old woman with diagnosis of apical HCM presented to our Clinic with syncope, palpitations, and New York Heart Association class IV dyspnea. Two years prior to presentation, she had a cardiac arrest, and ICD was placed, with 2 subsequent discharges. Preoperative transthoracic echocardiography (TTE) showed apical HCM with maximum septal wall thickness of 29 mm. There was midventricular obstruction with a resting intraventricular gradient of 31 mmHg. The left ventricular (LV) chamber size was markedly decreased, and indexed stroke volume (SV) was 29 mL/m^2 (normal 32-58 mL/m^2).

Results: The patient underwent operation to enlarge the LV cavity. After satisfactory general endotracheal anesthesia was induced, a primary median sternotomy was made, and the pericardium was opened in the midline. Cardiopulmonary bypass was commenced, the aorta was cross-clamped, and cold blood cardioplegia was given. The heart was elevated into the wound, and an apical ventriculotomy was made. Working through this incision, we removed a large amount of muscle from the septum to enlarge the LV cavity. We were careful to avoid injury to the anterolateral and posteromedial papillary muscles. After satisfying ourselves that we had augmented the LV end-diastolic volume, we closed the ventriculotomy using No. 1 Ethibond sutures and 2 felt strips. This was reinforced with an over-and-over 0 Prolene suture. Postoperative TTE showed an enlarged LV cavity with ejection fraction of 65%. The postoperative indexed SV increased to 37 mL/m^2. The patient had an uneventful recovery, and was discharged 8 days after surgery.

Conclusion: Apical myectomy is a surgical technique that can enlarge the LV cavity in severely symptomatic nonobstructive HCM patients with diastolic heart failure.

Notes:

29. Robotic-Assisted First Rib Resection: A Single Center Experience With a Novel Surgical Approach

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Authors: Stevan S. Pupovac[1], Paul Lee[1], Richard Lazarro[2], David Zeltsman[1], Julissa Jurado[1], Kevin Hyman[1], Vijay Singh[1]

Author Institution(s): *[1]Northwell Health, Astoria, NY; [2]Lenox Hill Hospital, New York, NY*

Objectives: Thoracic outlet syndrome (TOS) comprises a constellation of signs and symptoms that arise from neurologic and vascular compression of the brachial plexus and subclavian vasculature, respectively. When non-surgical treatment fails to appropriately alleviate TOS, surgical decompression of the neurovascular structures is indicated. Included is our novel surgical approach and experience.

Methods: Between July 2014 and January 2017, eighteen patients who underwent robotic-assisted first rib resection at our institution were reviewed.

Results: Ten women and eight men with a mean age of 45±11years had a robotic-assisted first rib resection; eight for neurogenic thoracic outlet syndrome (nTOS) and nine for venous thoracic outlet syndrome (vTOS). There were no complications and no conversion to open surgery. There was complete resolution of symptoms in all patients. Intraoperative blood loss was minimal (30±12.0 mL). The mean operative time was 111.6±54.4minutes. Length of stay was 1.7±1.9 days. Length of rib resected was 5.8±0.8 cm. The choice of anticoagulation for the vTOS cohort was Xarelto, for a mean of 5.1±1.8 months. Short-term follow-up (mean 10.3±4.9 days) revealed patent vasculature on post-operative venogram, with continued resolution of symptoms for the entire vTOS cohort. Further follow-up at two months and six months revealed that all patients remained symptom free. A chest tube was utilized in only three patients, for a mean duration of 1.3±0.6 days.

Conclusions: Robotic-assisted thoracoscopic first-rib resection offers a superior, magnified and well-visualized view of the thoracic inlet, while also avoiding the limitations and risks of neurovascular complications often associated with conventional approaches. This is an aesthetically pleasing, safe and effective technique that should be added to the armamentarium of the thoracic surgeon.

Notes:

30. Impact of Positive Margins and Adjuvant Radiation on Survival After Resection of Tracheal Adenoid Cystic Carcinoma

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Author Institution(s): *[1]Stanford University, Stanford, CA; [2]Duke University Medical Center, Durham, NC*

Objectives: Achieving negative margins can be technically difficult in patients with adenoid cystic carcinoma (ACC) of the trachea, but limited data exist regarding the benefit of adjuvant radiation. The purpose of this study was to quantify impact of positive margins on prognosis and to test the hypothesis that radiation improves survival in the setting of incomplete resection.

Methods: The impact of adjuvant therapy on survival of patients with tracheal ACC in the National Cancer Data Base from 1998-2015 who underwent resection with known margin status and with no documented nodal or distant disease, was evaluated using Kaplan-Meier and Cox proportional hazard analysis. Predictors of positive margins were evaluated using multivariable logistic regression model.

Results: Of 152 patients who met study criteria, 87 (57%) had positive margins following resection. Adjuvant radiation was given in 105 (69%) patients overall and to 66 (76%) of the 87 patients with positive margins. Increasing T status (adjusted OR, 6.31; 95% CI: 1.76-22.67; p=0.005 for T4 compared to T1) was associated with increased likelihood of having positive margins (**Table**). The survival of patients with positive margins was not significantly different than the survival of patients with negative margins (5-year survival 80% [95% CI: 69-87] vs 84% [95% CI: 70-91], p = 0.49, **Figure**) even after multivariable adjustment (HR, 2.24; 95% CI: 0.84-6.02; p=0.11). In the subset of patients with positive margins, there was no significant difference in survival between patients who did or did not receive post-operative radiation therapy (5-year survival: 80% [95% CI: 67-88] vs 80% [95% CI: 55-92], p=0.71) even after multivariable adjustment (HR, 0.54; 95% CI: 0.13-2.18; p=0.39).

Conclusions: The majority of tracheal ACC resections performed in this national cohort had positive margins. Adjuvant radiation was commonly used for positive margins but was not associated with a survival benefit.

Independent predictors of positive margins for patients who underwent resection for tracheal ACC

Characteristic	Odds Ratio	95% CI	P-value
Age (Unit = Year)	1.01	[0.98, 1.04]	0.65
Sex (Reference = Male)	1.05	[0.44, 2.50]	0.91
CDCC Score (Reference = 0)			
1	1.12	[0.43, 2.91]	0.82
2	0.26	[0.02, 3.60]	0.32
Year of Diagnosis	1.11	[0.96, 1.29]	0.16
Clinical T-Status (Reference = 1)			
2	2.47	[0.79, 7.74]	0.12
3	4.74	[1.00, 22.51]	0.05
4	6.31	[1.76, 22.67]	0.005

Notes:

31. Dehydrated Human Amnion/Chorion Membrane (Placenta) Reduces Anastomotic Leaks After Esophagectomy

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Commercial Relationships: *D.L. Miller: Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic

Author Institution(s): *[1]WellStar Health System, Marietta, GA; [2]CTCA, Newnan, GA*

Objectives: An anastomotic leak is a potentially fatal complication after esophagectomy. Various surgical techniques and reinforcement materials have been applied, but none are fully effective. Recently, we introduced dehydrated human amnion/chorion membrane (placenta) reinforcement to an esophogastrectomy anastomosis to reduce leaks and maintain intestinal integrity.

Methods: We retrospectively reviewed prospective data of 79 consecutive patients who underwent an esophagectomy after neoadjuvant chemoradiation over a 38-month period to determine if placenta reinforcement reduces esophageal anastomotic leaks.

Results: From January 2015 through July 2016 our esophageal anastomotic leak rate was 7% (3/45). From August 2016 through March 2018, we performed 34 esophagectomies, 18 patients (53%) underwent placenta reinforcement and 16 did not. The majority of these 34 patients were men (85%) with a median age of 66 years (42 - 81). Location of anastomosis was the chest in 31 patients (91%) and the neck in 3. Anastomotic technique was modified Orringer in 30 patients (88%) and EEA in 4. Placenta reinforcement consisted of a 6 x 16 cm sheet wrapped around the anastomosis. There was no postoperative mortality. None of the placenta reinforced patients developed an anastomotic leak, while 4 (25%) of the 16 other patients did. The leak was diagnosed with pleural amylase and/or barium swallow. One of the placenta patients has a small bulge at their anastomosis and was prophylactically reinforced with an esophageal stent. The four non-placenta leak patients were treated with an esophageal stent placement in three and the remaining patient's leak resolved with observation only. At last follow-up, no patient had a late leak.

Conclusions: Early results show that placental reinforcement of an esophagogastric anastomosis proved to eliminate anastomotic leaks and maintain intestinal integrity. Further evaluation is warranted in a larger group of patients and at other institutions.

Notes:

32. Proficiency of Robotic Lobectomy Based on Prior Surgical Technique in The Society of Thoracic Surgeons General Thoracic Database

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Authors: Andrew F. Feczko[1], Hongwei Wang[2], Katherine Nishimura[2], Alexander S. Farivar[3], Adam J. Bograd[3], Eric Vallières[3], Ralph W. Aye[3], ***D***Brian E. Louie[3]
Commercial Relationships: B.E. Louie: Research Grant: Intuitive Surgical

Author Institution(s): *[1]Swedish Medical Center, Seattle, WA; [2]Cancer Research and Biostatistics, Seattle, WA; [3]Swedish Cancer Institute, Seattle, WA*

Objectives: Robotic lobectomy represents a paradigm shift for many surgeons. It is unknown if prior experience influences development of proficiency. We compared outcomes based on prior lobectomy experience using cumulative sum (CUSUM) analysis to assess proficiency.

Methods: Using the STS General Thoracic Database, we grouped surgeons as 'de novo' (DNS), open to robot (ORS), or VATS to robot (VRS). Operative time, blood transfusion, mortality and major morbidity were primary outcomes. Acceptable and unacceptable thresholds were determined a priori by review of the literature. A CUSUM control chart was generated per surgeon to evaluate the attainment of proficiency defined as 20 consecutive cases without crossing an upper control line indicating an unacceptable cumulative rate of negative outcomes, or deviation from the target operative time.

Results: From 2009-2016, 271 surgeons performed 5619 robotic lobectomies for early stage NSCLC. Of these, 65 (24%) performed ↗20 lobectomies with a median of 41 per surgeon totaling 4475 cases: DNS (15), ORS (21) and VRS (29) (**Table 1**; **Figure 1**). At an operative time target of 250 minutes, initial and sustained proficiency was attained by 40% of DNS compared to 14% of ORS and 21% of VRS. This improved to 47%, 29% and 21% after 20 cases. Proficiency was never achieved in 33%, 62% and 69%. Initial and sustained proficiency related to major morbidity was similar for ORS and VRS, but lower for DNS at 40%. After 20 cases, most were proficient (DNS 93%, ORS 100% and VRS 86%). The incidence of blood transfusion and 30 day mortality was rare approaching 90% proficiency for all groups.

Conclusions: Proficiency attainment with robotic lobectomy varies based on the outcome measured and prior experience, with improvement at 20 and 50 cases. ORS lagged behind in achieving operating time proficiency, suggesting the need for focused mentorship. Sustained operative time proficiency should be a key goal to improve resource utilization.

Summary of proficiency rates from CUSUM analyses

		Initial and Sustained Proficiency	Proficient by 20th case	Proficient by 50th case*
Major Morbidity Overall rate: 18% Target rate: 10% Unacceptable rate: 15%	De Novo	40%	93%	89%
	Open -> Robotic	67%	100%	100%
	VATS -> Robotic	69%	86%	92%
30d Mortality (p=.01) Overall rate: 1.1% Target rate: 1% Unacceptable rate: 5%	De Novo	93%	93%	100%
	Open -> Robotic	95%	95%	100%
	VATS -> Robotic	86%	97%	100%
Transfusion Overall rate: 3.5% Target rate: 5% Unacceptable: 10%	De Novo	93%	100%	100%
	Open -> Robotic	90%	95%	100%
	VATS -> Robotic	90%	97%	100%
Operative Time Median: 253 min. Target: 250 min.	De Novo	40%	47%	100%
	Open -> Robotic	14%	29%	57%
	VATS -> Robotic	21%	21%	67%

*As a percentage of surgeons that recorded at least 50 cases. (DN: 9 OR: 7 VR: 12)

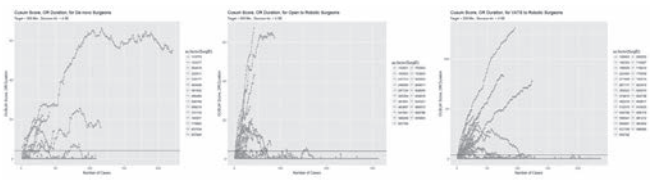

Figure 1: Representative CUSUM curves for operative time proficiency by transition type (DNS, ORS, VRS). Acceptability threshold set at 250 minutes (solid line). Points above this threshold represent an unacceptable result.

Notes:

33. Technique and Outcomes of Implementing Endobronchial and Intravenous Indocyanine Green for Segmentectomy

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Authors: Travis C. Geraci, ***D****Robert J. Cerfolio
Commercial Relationships: *R.J. Cerfolio: Consultant/Advisory Board: AstraZeneca, ConMed, Covidien LP, C-SATS, Ethicon, Google/Johnson & Johnson, Intuitive Surgical, Medtronic, Myriad, ROLO-7, TransEnterix

Author Institution(s): *New York University, New York, NY*

Objectives: Near-infrared contrast localization may permit accurate identification of small pulmonary lesions during resection. Our objectives are to describe our evolving surgical techniques for the use of indocyanine green (ICG) via both the bronchoscope and the vein to help guide minimally invasive segmentectomy.

Methods: This is a retrospective review of a consecutive series of patients from a single surgeon's prospective database. All patients in the study were scheduled to undergo an anatomic segmentectomy.

Results: Between January 2010 and February 2018, they were 214 consecutive robotic segmentectomies, of which 78 administered ICG via navigational bronchoscopy and by intravenous injection. Navigational bronchoscopy with ICG correctly identified the lesion in 75 of the 78 cases (96%). Median time for navigational bronchoscopy was 19 minutes. Improvements in our technique included: lowering the dose of ICG, the addition of a 1 mL flush, eliminating methylene blue, injection within 4 mm from the pleural surface, and placing a suture in the lesion at the start of the operation prior to ICG diffusion. The optimal view of the intersegmental plane was observed after 12 mL of intravenous ICG. An R0 resection was achieved in all patients. The median length of stay was one day (0 – 3 days). Morbidity occurred in 5 patients and there were no mortalities within 30 or 90 days.

Conclusions: Navigational bronchoscopy using ICG tattooing is a highly effective technique for identifying small and/or ground glass pulmonary nodules that require resection. In addition, intravenous ICG helps delineate the arterial anatomy to guide the staple-line resection of the lung parenchyma during segmentectomy.

Notes:

34V. Robotic Assisted Retrosternal Thyroidectomy

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Authors: Ray K. Chihara, Jessica Liu, Snehal G. Patel, ***D****Manu Sancheti
Commercial Relationships: *M. Sancheti: Consultant/Advisory Board: Intuitive Surgical; Speakers Bureau/Honoraria: Intuitive Surgical

Author Institution(s): *Emory University, Atlanta, GA*

Objectives: Retrosternal thyroid goiters may occur in the anterior, middle and posterior mediastinum. Symptomatic retrosternal thyroid goiters are usually amenable to resection via a cervical incision. Sternotomy and thoracotomy are typically employed for retrosternal goiters not amenable to a cervical approach alone. We demonstrate a robotic assisted approach for resection of a retrosternal thyroid goiter in the middle mediastinum.

Methods: A patient developed a persistent cough and dyspnea from an enlarged retrosternal thyroid. A combined cervical and right robotic assisted approach for resecting the retrosternal thyroid was undertaken. The patient was positioned in the supine position with a right bump in preparation for a possible right robotic assisted approach. The cervical approach was met with difficulties dissecting the mediastinal extension of the enlarged thyroid. Three robotic and one assistant port was placed into the right chest. The robot was docked and the mediastinal extension of the thyroid was released. The specimen was extracted from the cervical incision.

Results: The patient did not develop a hoarse voice concerning for recurrent laryngeal nerve injury. The chest tube was removed on post-operative day one. Pain was well controlled on oral agents. The patient was discharged on post-operative day one. Pathology demonstrated multinodular hyperplasia consistent with a goiter. The patient was doing well at the two week follow up visit with resolution of her persistent cough and dyspnea.

Conclusion: Robotic assisted approach to retrosternal thyroidectomy is feasible. Avoiding the use of sternotomy or thoracotomy may decrease recovery time. Further work is necessary to determine the role of the robotic assisted approach for retrosternal thyroidectomy.

Notes:

35. Impact of SVR Trial on Single Ventricle Outcomes in HLHS at an Institutional Level Extends Beyond Use of Sano

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Authors: W. Hampton Gray, Michael E. Bowdish, Wendy Mack, Winfield J. Wells, Vaughn A. Starnes, Ram Kumar Subramanyan

Author Institution(s): *University of Southern California, Los Angeles, CA*

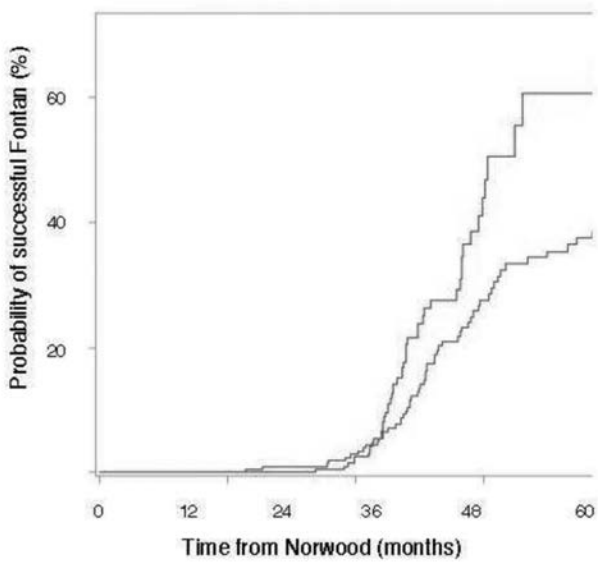
Discussant: *E. Dean McKenzie, *Children's Healthcare of Atlanta Egleston, Atlanta, GA*

Objectives: The SVR trial compared outcomes in hypoplastic left heart syndrome (HLHS) stratified by source of pulmonary blood flow (PBF) at Norwood palliation. At any individual institution, results of the SVR trial could have prompted additional changes. At our own center, we instituted two major changes following SVR trial – use of Sano and initiation of interstage monitoring program (ISMP). We sought to evaluate if the impact of SVR trial extended beyond the choice of PBF at our center.

Methods: We retrospectively reviewed the records of patients with HLHS who underwent stage I palliation (S1P) at our institution from 2004-2017. Era of care was dichotomized at 2010 as pre- and post-SVR.

Results: 256 patients underwent first stage at 4 (3-7) days and 3.2 (2.7-3.5) kg weight. Attrition during follow-up is shown in **Table**. Median follow up of 155 survivors is 7 (3.7-10.5) years. 189 underwent Glenn at 6 (5-7) months' age and 6 (5.5-6.8) kg weight. 123 underwent Fontan at 3 (3-4) years' age and 14 (13-15) kg weight. One patient underwent transplantation and five were lost to follow-up (3-post Norwood, 2-post Glenn). Cumulative incidence function analysis showed that after accounting for demographic and pre-operative factors, use of Sano (HR 1.2, 1.1-2.1) was associated with higher likelihood of successful Fontan completion. Enrolment in ISMP had a stronger association with Fontan completion (HR 1.9, 1.6-3.8, p<0.001, **Figure**).

Conclusions: Even though the SVR trial was designed to compare outcomes based on type of PBF, the bigger impact on outcomes in HLHS at our center was related to institution of ISMP in response to high interstage mortality observed in the trial. The benefit of well-executed prospective trials often extends beyond the primary variable analyzed, and may be particularly important in the care of children with complex disease processes such as HLHS.


Probability of successful Fontan (%)
60
40
20
0
12
24
36
48
60
Time from Norwood (months)

Notes:

36. Post-Norwood Outcomes Improved With Pulmonary Circulation Interventions

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A**uthors: Lillian Kang**, Nicholas C. DuPont, Jacob Miller, Melanie P. Subramanian, Vipul Sharma, *Pirooz Eghtesady

Author Institution(s): *Washington University in St. Louis School of Medicine, St. Louis, MO*

Discussant: *Lauren C. Kane, *Arnold Palmer Hospital of Children, University of Central Florida*

Objectives: The success of HLHS palliation is contingent upon the pulmonary circulation, therefore, most consider interventions to the pulmonary circulation to be a negative prognostic factor. We aimed to evaluate the outcomes of post-Norwood HLHS patients who received catheter-based pulmonary circulation interventions.

Methods: The Pediatric Heart Network Single Ventricle Reconstruction database was analyzed. Patients included in the intervention group underwent balloon angioplasty and/or stent placement anywhere along the pulmonary circulation, including either their modified Blalock-Taussig or right ventricle-pulmonary artery shunt. Subsequently, 2:1 propensity score matching was performed with 19 variables. The 1-year transplant-free survival for the intervention group, prior to and after propensity matching, was compared to that of intervention-free patients using Kaplan-Meier curves and log-rank tests. Subgroup analyses within the intervention group evaluated survival based on intervention type, location of the intervention, timing from Norwood, and number of interventions.

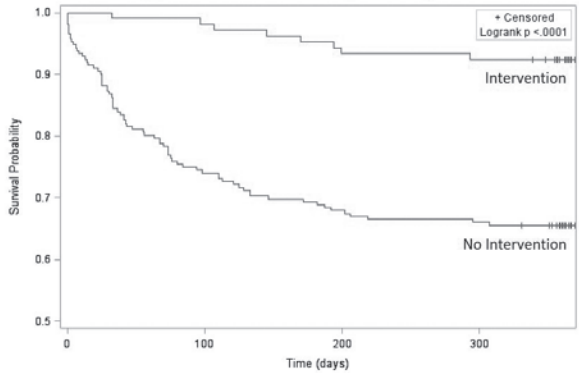
Results: Of 549 total HLHS patients who underwent Norwood, 163 received pulmonary circulation interventions. Survival for patients who received interventions was significantly higher than those who did not (84.7 vs 58.3%; $p<0.01$). Propensity score matching identified 106 patients who underwent intervention and 212 who did not. Survival for intervention patients was significantly higher (84.8 vs 54.4%; $p<0.01$) [**Figure**]. Subgroup analyses of the intervention group demonstrated no survival difference for intervention type, location of intervention, or number of interventions. However, a negative trend in survival was observed for patients who underwent earlier interventions ($p=0.05$) [**Table**].

Conclusions: Pulmonary circulation interventions are associated with improved survival in post-Norwood patients. This supports a re-evaluation of the current threshold for such interventions.

Post-Norwood Transplant-free Survival by Pulmonary Circulation Intervention Characteristic

Intervention Characteristics		Survival [%]	p-value
Type	Balloon angioplasty	85.80	0.48
	Stent placement	93.33	
	Both	91.30	
Location	Pulmonary arteries	86.61	0.96
	Systemic-to-pulmonary shunt	85.71	
	Both	86.67	
Quantity	Single	83.80	0.43
	Multiple	90.48	
Timing	Norwood Hospitalization	68.75	0.05
	Norwood Discharge to Stage II Discharge	86.55	
	Post-Stage II Discharge	71.43	

Post-Norwood Transplant-free Survival Curve by Pulmonary Circulation Intervention



Notes:

37. Outcomes in Management of Neonatal Distal Aortic Arch Hypoplasia With Coarctation

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Authors: *Joshua M. Rosenblum, Scott Gillespie, *Kirk R. Kanter

Author Institution(s): *Emory University, Atlanta, GA*

Discussant: *Kristine J. Guleserian, *Nicklaus Children's Hospital, Miami, FL*

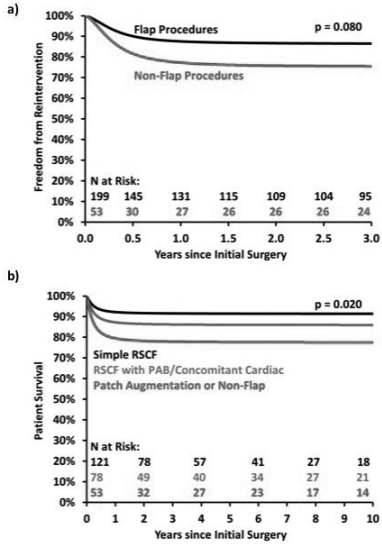
Objectives: We previously reported short-term outcomes of reverse subclavian flap augmentation for distal aortic arch hypoplasia associated with neonatal coarctation (RSCF/CoA). This study examines the mid-term outcomes of RCFS/CoA in patients with simple and complex congenital cardiac disease.

Methods: We reviewed 252 neonates (mean 7d; IQR 4-13d) with CoA associated with distal aortic arch hypoplasia from 4/1989 to 5/2016. Patients with prior arch interventions and diffuse hypoplasia were excluded. Univariate regression analysis, Kaplan-Meier survival, and competing risk analysis was performed. At the time of coarctation repair, 121(48.1%) patients underwent isolated RSCF/CoA, 61 (24.2%) patients underwent RSCF/CoA with PA band, 17 (6.7%) underwent RSCF/CoA with concomitant intracardiac operation, and 53 (21%) underwent arch patch augmentation without RSCF.

Results: RSCF/CoA repair with concomitant intracardiac operations increased over the study period. Median follow-up was 46.8 months (IQR 8.8-104.6), and median imaging follow-up was 44.1 months (IQR 6.2-98.6) with no significant difference between groups. Stenosis recurrence was 13.9% in all patients: 10.7% in simple RSCF/CoA, 14.8% in RSCF/CoA with PA band, 11.8% in RSCF/CoA with concomitant surgery, and 20.8% in non-flap patients (p=0.36). Freedom from reintervention in all RCSF/CoA patients was 87.5%, 86.7%, and 86.5% at 1, 2, and 3 years, while it was 77.2%, 75.8%, and 75.5% in the non-flap patients (p=0.080). Survival in isolated RSCF/CoA patients at 1, 5, and 10 years was 92.2%, 91.5%, and 91.4%, and in patch augmentation patients it was 79.5%, 77.6%, and 77.5% (**Figure**).

Conclusions: RSCF augmentation of distal arch hypoplasia is an appealing technique that addresses distal arch hypoplasia and CoA without cardiopulmonary bypass even in patients with complex cardiac disease or those requiring PA banding. RSCF/CoA repair fares better than patch augmentation possibly related to patient selection.

Freedom from reintervention (a) and overall survival (b) by operative groups.



Notes:

38V. Challenging Case: VSD Device Removal

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Authors: *Brian Kogon, Craig Mathis

Author Institution(s): *University of Mississippi Medical Center, Jackson, MS*

Discussant: *Carl L. Backer, *Ann & Robert H. Lurie Children's Hospital, Chicago, IL*

Objectives: Treatment of perimembranous ventricular septal defects has traditionally been surgical. Surgery most often includes midline sternotomy, cardiopulmonary bypass with cardioplegic arrest, and patch closure of the defect. Devices have become available that allow for percutaneous perimembranous ventricular septal defect closure in the cardiac catheterization lab, thereby eliminating the risks of open-heart surgery. Risks of device closure include incomplete closure, heart block, and interference with aortic and tricuspid valve function.

Methods: We present a challenging case of device removal for a persistent ventricular septal defect with a significant left-to-right shunt. Intra-operatively, both an aortotomy and right atriotomy were performed for optimal exposure. Through the initial aortotomy, a hole in the non-coronary leaflet of the aortic valve was identified that required closure. The hole was caused erosion from repeated contact with the device below. Through the subsequent right atriotomy, the device was removed. Despite a meticulous dissection, device removal caused a disruption in the aortic annulus and tricuspid valve regurgitation, both of which required surgical repair as well.

Results: Ultimately the repair went well and the post-operative echocardiogram showed no residual defect and good aortic and tricuspid valve function.

Conclusion: Complications from VSD device closure can be very challenging to repair surgically.

Notes:

39. Mitral Valve Replacement in Infants Using a 15-mm Mechanical Valve

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Authors: *Carl L. Backer, Osama Eltayeb, William J. Readdy, Michael C. Mongé, *Joseph M. Forbess, Anne E. Sarwark

Author Institution(s): *Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL*

Discussant: *Damien J. LaPar, *Columbia University, New York, NY*

Objectives: The 15-mm mechanical valve was approved by the FDA in March 2018. We review our experience for infants with this valve in the mitral position, focusing on outcomes and timing to repeat mitral valve replacement (MVR) because of somatic growth.

Methods: Between 2006-2017, 7 patients underwent 8 MVRs (1 repeat) with a 15-mm mechanical valve. We performed a retrospective chart review to examine short- and long-term outcomes.

Results: There was no operative mortality. Mean follow-up was 5.8±4.8 years (range 0.72-11.1). Six patients underwent MV operation prior to 15-mm MVR. Mean time from valvuloplasty to MVR was 53±39 (9-118) days. All patients were on mechanical ventilatory support at 15-mm MVR. Mean age, body weight, and BSA at time of 15-mm MVR were 0.5±3 (0.2-0.9) years, 5.6±0.8 (4.8-6.6) kg and 0.29±0.03 (0.27-0.32) m2, respectively. One patient required pacemaker implantation for 3° AV block. Two patients are doing well at 10 and 18 months. Four patients underwent re-MVR due to patient-prosthesis mismatch due to somatic growth. Mean time to repeat MVR was 23 months. There were 2 late deaths, one at 10 months unrelated to the valve. The other patient, who also had congenital diaphragmatic hernia, had early re-MVR due to prosthetic thrombosis. The child died of multiple complications after the 4th MVR, 2 years after 15-mm MVR.

Conclusions: The 15-mm MV was useful in treating MV disease in infants 2-12 months of age. This newly approved smallest available mechanical valve has a predicted mean time to replacement of 23 months in the mitral position.

Notes:

40. Mitral Valvuloplasty and Mitral Valve Replacement in Infants Less Than One Year Old

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Authors: Tracy R. Geoffrion[1], *Timothy J. Pirolli[1], Jessica Pruszynski[1], Adrian K. Dyer[1], *Ryan R. Davies[1], *Joseph M. Forbess[2], *Kristine J. Guleserian[3]

Author Institution(s): *[1]University of Texas Southwestern Medical Center, Dallas, TX; [2]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL; [3]Nicklaus Children's Hospital, Miami, FL*

Discussant: *Jennifer S. Nelson, *Nemours Children's Hospital, Orlando, FL*

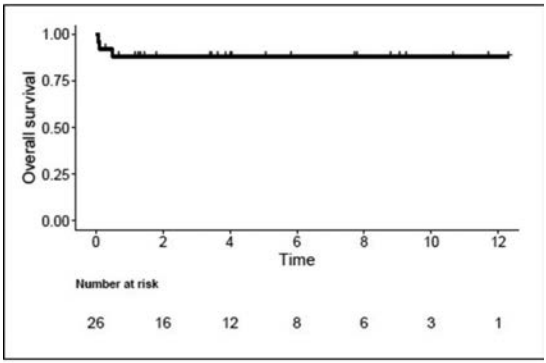
Objectives: Data is limited on outcomes associated with mitral valve surgery in infants. Prior studies report very high mortality and increased risk for late cardiac failure particularly for those with mitral stenosis. We sought to evaluate outcomes in patients with mitral stenosis (MS) or regurgitation (MR) who had mitral valvuloplasty or replacement in the first year of life.

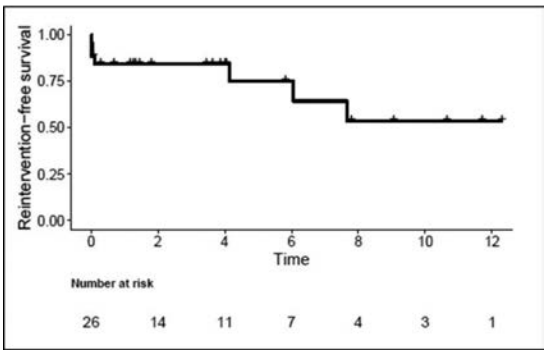
Methods: A retrospective analysis of all patients who underwent mitral valvuloplasty or replacement in their first year of life from 2004 to 2016 (n=26), excluding patients undergoing surgery for any form of atrioventricular canal defect.

Results: Median age and weight at surgery were 75 days (2-329) and 4.6 kilograms (3.0 -10.1). The primary mitral pathology was MR in 17 and MS in 9 patients. Median follow-up was 3.6 years (27 days- 12.3 years). Overall survival was 96.2% at 30 days and 88.3% at 1 year. There were 3 early deaths (11.5%), all within 6 weeks of surgery. There were no late deaths. Three patients required valve replacement, one of whom was a primary replacement who died 28 days after surgery. Re-intervention-free survival was 83.8%, 73.3%, and 48.9% at 1, 5, and 10 years (**Figure 1**). There was no difference in reintervention-free survival between patients with MR versus MS. No risk factors for death or re-intervention were identified.

Conclusions: Mitral valvuloplasty and replacement can be performed in infants under 1 year of age with non-trivial early mortality but good mid and long-term survival.

Kaplan Meier Plots





Notes:

*8:40 am - 8:53 am
Magnolia Ballroom A-C

B-V2 Early Migration of a Self-expanding Transcatheter Aortic Valve Prosthesis Causing Coronary Occlusion: A Practical Technique for Surgical Explantation

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Authors: Jordan P. Bloom, Michael Kwon, George Tolis

Author Institution(s): *Massachusetts General Hospital, Boston, MA*

Moderator: *Ross M. Reul, *Houston Methodist Hospital, Houston, TX*

Objectives: Transcatheter aortic valve implantation (TAVI) has become the standard of care for high-risk patients and is growing in popularity for lower risk patients. We report a case of early migration of a self-expanding transcatheter aortic valve prosthesis causing coronary obstruction and myocardial infarction.

Methods: A 76-year-old female with renal failure underwent an uncomplicated TAVI. 32 days later she presented with acute angina, ruled-in for myocardial infarction and was found to have iatrogenic coronary obstruction from the aortic valve prosthesis due to cephalad migration.

Results: The patient was taken to the operating room where a transverse aortotomy was made at the normal anatomic site (not cephalad to the prosthesis), exposing the metal stent component of the failed device. Multiple attempts at extraction were attempted, however the device was tightly adherent to the left ventricular outflow tract. A 3-0 Prolene suture was weaved through the stent to create a purse string and the suture was snared counteracting the radial force and thus reducing the circumference of the device. The prosthesis was subsequently removed without incident. A surgical aortic valve replacement was then carried out using a 21 mm bovine pericardial bioprosthesis. Cardiopulmonary bypass time was 81 minutes and aortic cross-clamp time was 63 minutes. The patient tolerated the procedure well.

Conclusion: Early migration is a rare complication after TAVI. Self-expanding prosthetic devices may require the use of techniques to counter-act the radial forces exhibited on the wall of the left ventricular outflow tract. This report describes a near lethal early complication and a technique that worked well to facilitate device removal.

**Please note: This break is scheduled from 8:30 am-9:00 am. These video abstract presentations will begin approximately ten minutes after the scheduled break time has begun to allow for attendees to transition from the general session rooms into the Exhibit Hall. *Actual presentation start times may vary. Each presentation is allotted eight minutes followed by another five minutes of discussio*n.

Notes:

41. Outcomes After Acute Type A Aortic Dissection in Patients With Prior Cardiac Surgery

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Authors: Elizabeth D. Krebs[4], *James H. Mehaffey[4], *Robert B. Hawkins[4], Jared P. Beller[4], Clifford Fonner[1], *Andy Kiser[2], Mark Joseph[3], *Leora Yarboro[4], Nicholas R. Teman[4], ***D***Gorav Ailawadi[4]
Commercial Relationships: *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

Author Institution(s): *[1]Virginia Cardiac Services Quality Initiative, Falls Church, VA; [2]East Carolina Heart Institute, Charlottesville, VA; [3]Carilion Clinic, Roanoke, VA; [4]University of Virginia, Charlottesville, VA*

Discussant: ***D***Anthony L. Estrera, *University of Texas Houston Medical School, Houston, TX*
Commercial Relationships: *A.L. Estrera: Consultant/Advisory Board: Gore

Objectives: Outcomes of acute type A aortic dissection (ATAAD) in the setting of prior cardiac surgery ("redo") are not well known, with a wide range of reported outcomes primarily at highly experienced individual centers. We aimed to compare outcomes in a multicenter cohort of patients undergoing repair of ATAAD with and without prior cardiac surgery, to define the impact of "redo" status on outcomes.

Methods: All patients undergoing surgical intervention for ATAAD in a regional collaborative Society of Thoracic Surgeons database from 2002 to 2017 were reviewed. Patients were stratified by primary vs redo sternotomy. Demographics, operative characteristics, outcomes and cost data were compared by univariate analysis. Multivariable regression models were used to assess risk-adjusted impact of redo status on outcomes.

Results: A total of 1,332 patients underwent surgery for ATAAD, of whom 121 (9.1%) were reoperations. Redo patients were older (63 vs. 58 years, p<0.01) with more comorbidities, including heart failure (16.5% vs. 8.1%, p<0.01) and peripheral arterial disease (34.7% vs. 15.7%, p<0.01). Intraoperatively, redo and primary patients had equivalent rates of aortic valve replacement (26.5% vs. 25.3%, p=0.78), aortic arch procedures (25.6% vs. 30.6%, p=0.25), and aortic root procedures (29.8% vs. 36.9%, p=0.12). Redo status was associated with nearly a 70% worse mortality, increased blood product utilization, and 30% longer hospital length of stay (**Table 1**). After risk adjustment, redo status remained associated with nearly twice the mortality (OR 1.87, p=0.01) and composite morbidity-mortality (OR 1.99, p<0.01) compared to primary operations.

Conclusions: Patients undergoing redo sternotomy for acute type A dissection repair exhibited an operative mortality of more than 25%. Redo status is an independent risk factor for mortality and major morbidity. These data should be considered when counseling patients and families prior to acute surgical intervention.

Univariate Comparison of Outcomes in Patients With and Without Prior Cardiac Surgery

Outcome	Prior Cardiac Surgery (n=121)	No Prior Surgery (n=1211)	p-value
Operative Mortality	32 (26.5%)	190 (15.7%)	<0.01
Major Morbidity	76 (62.8%)	676 (55.8%)	0.14
Stroke	9 (7.5%)	113 (9.4%)	0.50
Reoperation Required	15 (12.4%)	109 (9.0%)	0.22
Intraoperative RBC Units Received	4 [2-6]	1 [0-4]	<0.01
Cardiopulmonary Bypass Time (min)	217 [149-293]	178 [140-224]	<0.01
Length of Stay (days)	13 [8-20]	10 [6-17]	<0.01
Total Hospital Cost	$73,430 [$40,910 - $116,100]	$61,050 [$40,350 - $104,640]	0.17

Notes:

42V. The Buffalo Trunk Technique for Aortic Arch Reconstruction

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Commercial Relationships: *J. Pal: Research Grant: Medtronic; J.C. Cleveland: Research Grant: Abbott

Author Institution(s): *University of Colorado, Aurora, CO*

Discussant: Eric E. Roselli, *Cleveland Clinic, Cleveland, OH*

Objectives: The frozen elephant trunk can facilitate the repair of arch and proximal descending aortic pathologies. Commercially available hybrid grafts may simplify this approach by allowing for a single suture line with the soft graft secured to the stent, potentially streamlining the distal anastomosis. However, this is a commodity not available at all institutions. We developed a system to streamline performance of the frozen elephant trunk that obviates the need for a hybrid graft and decreases operating times.

Methods: Our technique utilizes a soft-branched graft along with stent graft to create a distal anastomosis that incorporates the aorta, stent graft, and soft graft (**Figure**). Most of the cases were zone 2 reconstructions, with reinstitution of distal flow prior to left common carotid reconstruction. Patient characteristics, operative times, and peri-operative outcomes were analyzed.

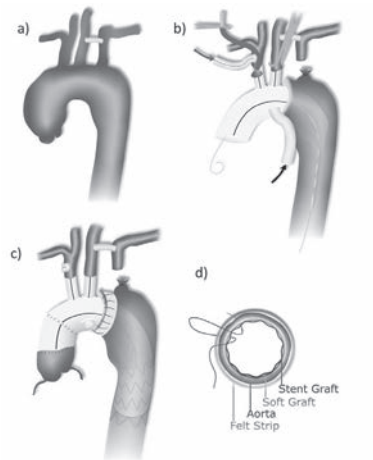
Results: A total of 37 patients underwent the Buffalo Trunk procedure from 1/2016 through 3/2018. The **table** summarizes some patient characteristics along with operative data and peri-operative outcomes. Bypass times averaged around 162 minutes and circulatory arrest times averaged at 24 minutes, in some cases as low as 12 minutes. The stroke rate was about 5% and 30-day mortality occurred in 2 patients.

Conclusion: The benefits of a hybrid approach to the frozen elephant trunk can be attained without the complex technology as presented here by our technique, the Buffalo Trunk. Evolution of this approach has facilitated shorter circulatory arrest and subsequently overall decreased operative times without compromising outcomes.

Patient characteristics, operative data, and outcomes for the Buffalo Trunk cohort

Characteristics	
Number	37
Age	60.3 ± 2.3
BMI	26.4 ± 0.8
Gender (Female)	9 (25%)
Emergent	14 (40%)
Redo	19 (55.9%)
Operative Data	
Cardiopulmonary Bypass (min)	162 ± 9.9
Aortic Cross Clamp (min)	67 ± 7.9
Circulatory Arrest (min)	24 ± 1.9
Nadir Temperature (° C)	25.5 ± 0.5
Post-Operative Transfusions	
Red Blood Cell Transfusions	2 [0-4]
Platelet Transfusions	0 [0-1.8]
Plasma Transfusions	1 [0-3.5]
Complications	
Delirium	3 (8.1%)
Transient Ischemic Attack	3 (8.1%)
Seizures	3 (8.1%)
Stroke	2 (5.4%)
Arrhythmia	6 (16.2%)
Heart Failure	0
Renal Failure	1 (2.7%)
Liver Failure	0
Need for Reoperation	9 (24.3%)
30-Day Mortality	2 (6.5%)

Figure: in panel (a) is a schematic of a carotid-subclavian bypass which is typically performed prior to the procedure. Panel (b) shows placement of the buffalo trunk during circulatory arrest. The top arrow represents selective antergrade cerebral perfusion through the innominate cannula while the bottom represents reperfusion through the side arm graft after completion of the distal anastomosis. In panel (c) is a completed Buffalo Trunk with cross section of the distal anastomosis represented in panel (d).



43. The Addition of Aortic Root Procedures During Elective Arch Surgery Does Not Confer Added Morbidity nor Mortality

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Authors: *William B. Keeling[1], David H. Tian[2], Jakob Heinz[3], Malakh Shrestha[4], Takuya Fujikawa[5], *Joel Corvera[6], Marco Di Eusanio[7], *Bradley G. Leshnower[1], ***D***Edward P. Chen[1]

Commercial Relationships: *E.P. Chen: Speakers Bureau/Honoraria: Cryolife

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Objectives: During elective aortic arch replacement, the addition of a root procedure has an unknown effect on morbidity and mortality. The purpose of this study is to determine the effect of adding a root procedure to elective aortic surgery.

Methods: The ARCH Database was queried for all elective aortic arch replacements with and without root replacement using moderate hypothermic circulatory arrest and antegrade cerebral perfusion from 2000-2015. Propensity score matching analysis was used to balance covariates, and a logistic regression model was created.

Results: 1169 patients were included for analysis, and 320 (27.4%) underwent an aortic root procedure. Patients undergoing root procedures were younger (69 vs. 61), had less coronary artery disease (20% vs. 32%) and had a higher incidence of Marfan's syndrome (4.2% vs. 10.0%) ($p<0.001$ for all). Concomitant CABG (26.6% vs. 19.7%), total aortic arch replacement (41.6% vs. 84.3%), and elephant trunk procedures (46% vs. 17.2%) were performed more frequently in the non-root cohort, ($p<0.001$ for both). Cardiopulmonary bypass and aortic crossclamp times were significantly longer in the cohort who underwent root procedures while cerebral perfusion times were longer in the non-root cohort ($p<0.001$ for all). In both the matched and non-matched analyses, postoperative outcomes were not significantly different between patients who underwent root procedures and those who did not ($p>0.05$ for all outcomes). **Table 1** details the postoperative outcomes for the propensity matched cohort. Multivariable logistic regression analyses showed no difference in mortality rates (Odds ratio 0.62 [0.9-1.34], $p=0.22$) nor in rates of permanent stroke (Odds ratio 0.89 [0.36-2.24], $p=0.81$) between root and non-root cohorts.

Conclusions: The addition of an aortic root procedure during elective aortic arch surgery lengthens cardiopulmonary bypass and aortic crossclamp times but does not increase postoperative morbidity nor mortality.

Propensity Matched Postoperative Outcomes

	Non-root (n=238)	Root procedures (n=238)	P value
Mortality	17 (7.1%)	18 (7.6%)	0.72
Permanent Neurologic Deficit	11 (4.7%)	10 (4.2%)	0.63
Temporary Neurologic Deficit	11 (4.7%)	11 (4.8%)	0.74
Spinal Cord Injury	4 (1.9%)	3 (1.4%)	0.79
Myocardial Infarction	1 (0.5%)	5 (2.4%)	0.14
Acute Kidney Injury	23 (10.4%)	20 (9.7%)	0.69
Re-exploration for bleeding	17 (7.6%)	28 (12.7%)	0.12

Notes:

44. Open Descending and Thoracoabdominal Repairs in Patients Younger Than 50 Years Old

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Commercial Relationships: *A.L. Estrera: Consultant/Advisory Board: Gore

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Discussant: *Bradley G. Leshnower, *Emory University, Atlanta, GA*

Objectives: In an era with growing emphasis on endovascular therapies, open repair has been reserved for younger patients with genetically associated pathologies and often with more extensive disease. Few studies have characterized outcomes in patients younger than 50 years of age who underwent open descending/thoracoabdominal aortic aneurysm (D/TAAA) repairs.

Methods: We divided 1896 D/TAAA repairs into two groups: younger (<50 years, N=254, 13%) and older (>=50 years, N=1642, 87%) to compare outcomes. Preoperative and postoperative outcomes were examined.

Results: Younger patients had significantly more Marfan patients (23% vs. 1%, P<0.001), chronic dissection (63% vs. 26%, P<0.001), family history of aortic aneurysms (15% vs. 6%, P<0.001), redo (18% vs. 12%, P=0.012), prior ascending aortic repair (36% vs. 17%, P<0.001), and fewer comorbidities (hypertension, chronic lung disease, chronic kidney disease and coronary artery disease, all P<0.001). Frequency of female sex (33% vs. 38%, P=0.207) and emergent repairs (9% vs. 9%, P=0.797) were similar between two groups. The younger cohort underwent significantly more extent II repairs (28% vs 15%, P<0.001). Postoperative adverse events were significantly lower in the younger patients (30-day mortality 6% vs. 17%, P<0.001; paraplegia 2% vs. 5%, P=0.011; acute kidney injury 18% vs 30%, P<0.001). In multivariate analysis, low glomerular filtration rate, extent II repairs, emergency, redo, coronary artery disease, smoking, cerebrovascular disease were risks for long-term mortality, however, age <50 years was a protective factor (hazard ratio: 0.594, P=0.001).

Conclusions: Patients under 50 years had a higher prevalence of Marfan syndrome and chronic dissection requiring more extensive repairs but early and long-term outcomes were superior compared to the older patients (> 50 years). Thus, in patients younger than 50 years old, open repair can be performed with good results and should be initially considered.

Notes:

45. Optimal Surveillance for Node Negative Early Stage Esophageal Adenocarcinoma Following Esophagectomy

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Objectives: Current screening guidelines following curative treatment for esophageal cancer remain largely undefined. Recommendations must take into account factors that influence recurrence including histology, treatment modalities and nodal status. The purpose of this study was to characterize recurrence in patients with early esophageal adenocarcinoma treated with surgical resection.

Methods: Patients who had undergone esophagectomy with pathologic T stage 1 and 2 esophageal adenocarcinoma without positive lymph nodes and who had not received neoadjuvant therapy were identified from a prospectively maintained database at a single institution. Univariate analysis was performed using Fisher's exact test for categorical and Student's T test for continuous variables. Cox regression analysis was performed to analyze factors that influence recurrence.

Results: Over a median follow of 3.7 years (IQR 1.2-6.9), 31/264 (11.7%) were identified with cancer recurrence (15 locoregional and 16 distant). There were 9/93 (9.7%), 14/135 (10.4%), and 8/35 (22.9%) recurrences in T stage 1a, 1b and 2, respectively. Patients with recurrence had larger tumor size and worse tumor differentiation ($p<0.05$). No difference in recurrence was observed between T stage groups or Barrett's on surgical pathology. On univariate analysis, pathologic T1 had longer time to recurrence than T2 (median, IQR: 31, 10.2-42.5 vs 21.8 months, 10.1-26.4)($p=0.01$). Only size and poor differentiation predicted recurrence on multivariable regression ($p<0.05$).

Conclusions: Our results suggest that patients with early node-negative esophageal adenocarcinoma treated with esophagectomy alone do not need surveillance more often than every 12 months. Tumor size and histologic differentiation predicted recurrence. Patients with T2 disease recurred earlier than T1.

Table 1. Comparison of clinicopathologic characteristics between patients with and without recurrence

	No Recurrence (n=225)	Recurrence (n=31)	p value
Age (Mean ± SD)	64.2 (10.4)	63 (10.2)	0.83
Signet Cell, n (%)	20 (8.9)	7 (22.6)	0.02
Smoker, n (%)	171 (73.7)	21 (67.7)	0.52
T Stage (%)			
1	205 (88.4)	23 (74.2)	0.029
2	27 (11.6)	8 (25.8)	
Grade (%)			
1	43 (20)	1 (3.2)	0.007
2	119 (55.3)	15 (48.4)	
3	53 (24.7)	15 (48.4)	
Vascular Invasion, n(%)	38 (17)	9 (30)	0.129
Size (cm) (Mean ± SD)	1.7 (1.5)	2.4 (1.5)	0.029
Pathologic Barrett's, n(%)	204 (89.1)	24 (77.4)	0.079

Notes:

46. Enhanced Recovery (ER) After Pulmonary Lobectomy - Eliminating Foley Catheters - Have We Gone Too Far?

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Commercial Relationships: *R.J. Cerfolio: Consultant/Advisory Board: AstraZeneca, ConMed, Covidien LP, C-SATS, Ethicon, Google/Johnson & Johnson, Intuitive Surgical, Medtronic, Myriad, ROLO-7, TransEnterix

Author Institution(s): *New York University, New York, NY*

Objectives: Our objective is to evaluate the efficacy of our current protocol that eliminated Foley urinary catheters in patients undergoing lobectomy and to identify the incidence and risk factors for postoperative catheter insertion.

Methods: This is a retrospective cohort study of a prospective database.

Results: From January 2015 - December 2016 there were 199 consecutive patients who underwent lobectomy, all were performed robotically (5 were converted to open). Two had an indwelling catheter pre-operatively, two had a previous prostatectomy and two male patients had operations longer than 3.25 hours and had a Foley placed immediately post-operatively as per protocol. The median age of the remaining 193 patients was 67 (36% males). Median operative time was 2.03 hours (range of 1.05 – 4.16). Median blood loss was 20 ml. No patients required a transfusion. The median length of stay was 3 days. Forty-eight (25%) of the 193 failed our enhanced recovery protocol and required a postoperative Foley catheter. Twenty-eight of 69 men (41%) and 20 of 124 women (16%) failed the protocol. Significant risk factors were: male gender (p=0.0002), age ↗ 55 (p=0.034), and operative time ↗ 3 hours (p=0.011).

Conclusions: The goal of enhanced recovery is to improve outcomes via variable reduction which eliminates errors and lowers cost. After eliminating the standard use of Foley urinary catheters in patients undergoing robotic lobectomy, 41% of male patients and 16% of woman developed post-operative urinary retention, requiring a urinary catheter. Our new revised lobectomy protocol uses a Foley prior to incision in selected high-risk patients.

Notes:

47. Liposomal Bupivacaine Enhances the Pain-Control Benefits of Uniportal Thoracoscopic Lobectomy

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Commercial Relationships: N. Veeramachaneni: Consultant/Advisory Board: Pacira Pharmaceuticals

Author Institution(s): *The University of Kansas Medical Center, Prairie Village, KS*

Objectives: Liposomal bupivacaine field block is gaining popularity as a critical element of enhanced recovery after surgery (ERAS) protocols in thoracic surgery. Uniportal thoracoscopic surgery has been reported to result in less narcotic consumption compared to traditional VATS. Our objective was to evaluate the post-operative narcotic consumption of patients undergoing uniportal thoracoscopic lobectomy with the use of 0.25% bupivacaine versus those given liposomal bupivacaine.

Methods: All consecutive patients undergoing uniportal thoracoscopic lobectomy at an academic medical institution were recorded between October 2015 and February 2018. Uniportal technique was utilized for all patients. Narcotic consumption was converted to oral morphine equivalents (OMEq) using standard formulas. Patients underwent posterior serratus and intercostal nerve blocks with 0.25% bupivacaine or liposomal bupivacaine, transitioning in March of 2017. Other adjuncts such as gabapentin, or COX-2 inhibitors were not administered.

Results: Data were reviewed on 86 patients. There was no difference between groups with regard to age, gender, tumor size, length of stay, or duration of post-operative thoracostomy tube. The groups had a similar rate of complications including atrial fibrillation and need for chest tube > 2 days. Patients undergoing field blocks with liposomal bupivacaine consumed fewer narcotics on post-operative day 0. For the entire hospitalization there was a trend for less consumption in the liposomal bupivacaine patients (**table**); by post-operative day #2, narcotic consumption in either group was equivalent to 5mg of oxycodone TID.

Conclusions: We have previously demonstrated decreased narcotic consumption with the use of uniportal thoracoscopic technique over traditional multiincision VATS. The use of liposomal bupivacaine posterior serratus and intercostal field blocks further enhanced pain control, and diminished narcotic consumption.

Narcotic Usage (in Oral Morphine Equivalents)

	Bupivicaine (n=51)	Liposomal Bupivicaine (n=35)	P value
POD #0	60 (34, 102)	24 (9, 62)	0.001
POD #1	66 (34, 113)	41 (28, 80)	0.078
POD #2	24 (8, 38)	23 (11, 39)	0.813
Total for Hospitalization	180 (124, 271)	128 (59, 225)	0.118

Data expressed as median (inter-quartile range)

Notes:

48V. Narcotic Free VATS Lobectomy

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Commercial Relationships: *D.L. Miller: Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic

Author Institution(s): *WellStar Health System, Marietta, GA*

Objectives: VATS approach has become the standard for early stage lung cancer surgery. Unfortunately narcotics are still used for postoperative pain management, which may lead to increased complications and even long-term addiction. We have instituted a thoracic cavity field block with extended release local anesthetic agents to help reduce narcotic use in over 200 patients. Recently, we have adopted a narcotic free VATS approach for pain management.

Methods: Video of our first narcotic free VATS lobectomy.

Results: The patient is a 65 yo women, former smoker of 32 PYs. The patient underwent lung cancer screening and was found to have a 2.2 cm indeterminate pulmonary nodule (IPN) in the right upper lobe (RUL) with no enlarged lymph nodes (LN). PET scan demonstrated a PET-avid RUL IPN (SUV 4.2) and no LN uptake. PFTs were FEV1 2.69 L (75%) and DLCO (76%). Planned diagnosis and treatment was a narcotic free right VATS, wedge resection IPN, RUL lobectomy and LN dissection. Day of surgery patient received 300mg gabapentin and 1000mg acetaminophen orally one hour before incision. Intraoperative thoracic cavity field block of T2 through T11 and full thickness of all three VATS Incisions was performed with a mixture of bupivacaine liposomal (20cc), bupivacaine 0.25% plain (60cc) and normal saline (200cc) as well as 30 mg IV ketorolac. Postoperative management was scheduled gabapentin 300 mg PO Q 8 hours, acetaminophen 1000 mg PO Q 8 hours and ketorolac 30 mg IV Q 6 hours. Patient was discharged on POD 2 after CT removal. Discharge medications were gabapentin 300 mg PO TID, acetaminophen 1000 mg PO TID, and Ibuprofen 600 mg PO TID. Patient returned to work at 3 weeks with no pain.

Conclusion: Narcotic free VATS lobectomy is possible with a multimodality pain regiment. Patients have enjoyed the transition to narcotic free surgery with less side effects and no fear of dependency. Team approach (Preop, Intraop, and Postop) and patient education is warranted for success.

Notes:

49. Double Aortic Arch With Kommerell Diverticulum

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Discussant: *Brian E. Kogon, *University of Mississippi Medical Center, Jackson, MS*

Objectives: Vascular rings with a Kommerell diverticulum (KD) most commonly occur in patients with a Right aortic arch. Enlargement of the diverticulum over time can lead to independent compression of the trachea and esophagus. We report on a less commonly seen subset of vascular ring patients – those with with a Double Aortic Arch and a KD.

Methods: Between 1990 and 2017, 11 patients with a Double Aortic Arch underwent vascular ring repair with KD excision. We performed a retrospective chart review of these patients to characterize their demographics and outcomes.

Results: All 11 patients (8 male, 3 female) had a double aortic arch that was right dominant and also had a KD. The patients ranged in age from 6 months-29 years (mean age 4.9±4.3 years). Median age was 4 years. All patients had preoperative dysphagia and compression of the distal trachea, ranging from 40%-80% (mean 63±12%). All patients had division of their left aortic arch, division of the ligamentum, and resection of the KD. The left subclavian artery was transferred to the left carotid artery in 2 patients. The mean size of the diverticula was 9x10 mm, with the largest being 15x15 mm. There were no major postoperative complications or readmissions. The postoperative length of stay was 3.1±0.8 days. Five of the patients report no related persisting symptoms. The remaining 6 patients report substantial symptomatic relief with only minor respiratory symptoms.

Conclusions: Vascular ring patients with a Double Aortic Arch can also have a significant KD. In addition to dividing the smaller aortic arch and the ligamentum, we recommend excision of the KD.

Notes:

50V. Surgical Treatment of Biventricular Outflow Tract Obstruction in Hypertrophic Cardiomyopathy

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Discussant: *Joseph A. Dearani, *Mayo Clinic, Rochester, MN*

Objectives: Hypertrophic cardiomyopathy is usually associated with left ventricular outflow tract obstruction. It is rare to have a concomitant obstruction of the right ventricular outflow tract requiring resection. Patients with biventricular outflow tract obstruction tend to have more severe symptoms than patients with left ventricular outflow tract obstruction alone and non-obstructive hypertrophic cardiomyopathy. We present a case of a child with the aforementioned diagnosis, who was successfully treated surgically.

Methods: In the video, we demonstrate the successful surgical repair of biventricular outflow tract obstruction. The repair consisted of the traditional extended myectomy for the left ventricular outflow tract and patch augmentation of the right ventricular outflow tract.

Results: Postoperatively, the patient was extubated on postoperative day 1, transferred to the step-down unit on postoperative day 3 and eventually discharged on postoperative day 14. He developed atrial tachycardia postoperatively, treated with sotalol. Follow-up at 1-month showed an asymptomatic patient with complete resolution of the biventricular outflow tract obstruction and normal systolic function by transthoracic echocardiography.

Conclusion: Surgical treatment of biventricular outflow tract obstruction by performing right-sided septal myectomy and patch augmentation of the right ventricular outflow tract in addition to the conventional left sided septal myectomy is feasible and can completely eliminate biventricular outflow tract obstruction.

Notes:

51. Factors Associated With Survival Following Extracorporeal Cardiopulmonary Resuscitation in Children

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Discussant: *Ross M. Ungerleider, *Driscoll Children's Hospital, Corpus Christi, TX*

Objectives: Survival of children having cardiac arrest refractory to conventional cardiopulmonary resuscitation (CPR) is very poor. We aimed to examine current era outcomes of extracorporeal CPR (ECPR) support for refractory arrest in children with various pathologies.

Methods: We entered demographic, morphologic, clinical, surgical and support details of 182 children who underwent ECPR performed during active chest compression at our institution (2002-17) into a multivariable logistic regression models to determine factors associated with survival.

Results: 182 children, median age 54 days (IQR 11-272), required ECPR. Among those, 155 (85%) had cardiac disease including 133 (73%) with congenital heart disease (73 of those with single ventricle). 117 patients (64%) had postoperative ECPR. The remaining 27 (15%) had respiratory arrest with cardiac disease. Median CPR duration was 27 min (IQR 18-40) min, while median support duration was 3.0 (IQR 1.6-5.3) days. 73% of patients survived > 24 following support discontinuation and 47% survived to hospital discharge. Survival was 49% in cardiac patients (vs. 37% in non-cardiac patients, p=0.046). Mean CPR durations was 29 and 31 min in survivors and non-non-survivors (p=0.87) while mean support duration was 3.9 and 5.6 days, respectively (p=0.054).

On regression analysis, factors associated with mortality included pathology other than cardiomyopathy, single ventricle, lower pre-support PH, renal failure, and neurologic complications. CPR duration, age, gender, weight, cannulation site, interval following surgery were not found to be significant factors in our series.

Conclusions: ECPR plays a valuable role in children with refractory cardiac arrest with nearly half of the patients surviving to hospital discharge. Survival can be expected even with relatively longer CPR durations. ECPR as a bridge for other device support is valuable in patients with cardiomyopathy awaiting heart transplantation.

Notes:

52V. Correcting a Rare Congenital Anomaly in an Adult - A Case Report

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Authors: William J. Parker[1] John Duggan[2], Samuel Richey[3], *Charles B. Huddleston[3], Junewai Reoma[1]

Author Institution(s): [1]*Walter Reed National Military Medical Center, Beltsville, MD;* [2]*Uniformed Services University of the Health Sciences, Bethesda, MD;* [3]*St. Louis University School of Medicine, St. Louis, MO*

Discussant: *Carlos M. Mery, *University of Texas Dell Medical School/ Dell Children's Hospital, Austin, TX*

Objectives: Anomalous origin of the right coronary artery from the pulmonary artery (ARCAPA) is an extremely rare condition with an uncertain natural history. Here we present an otherwise healthy active duty service member who was found to have anomalous right coronary artery arising from the pulmonary artery as an incidental discovery during a workup for possible pulmonary embolus.

Methods: We describe a preoperative workup which showed dilation of the coronaries and evidence of ischemia. Operative technique for restoration of a two-vessel coronary system is described.

Results: There are several case reports in the literature of patients with sudden cardiac death from this condition. The patient underwent an uncomplicated transposition of the right coronary artery from the pulmonary artery to the aorta in an end-to-side fashion with a patch repair of the pulmonary artery. Postoperative imaging demonstrated reduction in the coronary dilation, and resolution of ischemia.

Conclusion: Surgical repair, which can include simple ligation of RCA, ligation of RCA with bypass, or re-implantation of the RCA into the aorta, should be pursued regardless of symptoms, with the goal of eliminating left-to right shunt and establishing dual coronary flow. This case report demonstrates successful technique of re-implanting the RCA with patch repair of the pulmonary artery, with care to minimize cross-clamp time.

Notes:

*10:10 am – 10:23 am
Magnolia Ballroom A-C

B-V3. Giant Left Main Coronary Artery Aneurysm: Evaluation and Surgical Repair

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Authors: *Faisal G. Bakaeen, Eric E. Roselli, Gosta B. Pettersson, Lars G. Svensson

Author Institution(s): *Cleveland Clinic, Cleveland, OH*

Moderator: *DScott A. LeMaire, *Baylor College of Medicine, Houston, TX*
Commercial Relationships: *S.A. LeMaire: Consultant/Advisory Board: Biom'up; Other Research Support: CytoSorbents, W.L. Gore & Associates, Terumo Aortic

Objectives: Coronary artery aneurysms (CAAs) are rare lesions, and the left main coronary artery (LMCA) is the least frequently involved. To date, there is no consensus regarding the optimal management of CAAs. We report the case of a 67-year-old female who presented with angina and dyspnea on exertion secondary to a 6.3cm LMCA aneurysm (largest reported 6 cm). The video addresses important aspects relating to the patient work-up and surgical management. A median sternotomy was performed, the left internal mammary artery (LIMA) and a short segment of saphenous vein were simultaneously harvested. Next, marsupialization of the aneurysm sac was carried out after institution of cardiopulmonary bypass and aortic cross clamping. The LMCA ostium was clearly evident, and we used probes to identify the ostia and trajectory of the LAD and LCx. We used 2 vein segments to bypass from the ascending aorta end-to-end to the endoluminal ostia of the LAD and LCx, separately. Next, the orifice of the LM was oversewn. Last, the in situ LIMA graft was anastomosed to the mid-LAD as a precautionary intervention to supplement the venous reconstruction.

Methods: Stress testing showed marked rest and perfusion defects in the anterior and lateral walls. Coronary angiography demonstrated a large LMCA aneurysm, with swirling of contrast within the aneurysm and no runoff. CT coronary angiography demonstrated patent left anterior descending (LAD) and circumflex (LCx) arteries with no significant atherosclerosis. Because of the patient symptoms and the above findings surgery was recommended.

Results: The patient was weaned off cardiopulmonary bypass without difficulty and recovered well from surgery. Pre-discharge CT angiography demonstrated a successful aneurysm repair and patent grafts. The patient was symptom-free at 3-months.

Conclusion: Marsupialization and the endoluminal approach to treat a giant CAA was technically straightforward, effective, and safe for this particular anatomy.

**Please note: This break is scheduled from 10:00 am-10:30 am. These video abstract presentations will begin approximately ten minutes after the scheduled break time has begun to allow for attendees to transition from the general session rooms into the Exhibit Hall. *Actual presentation start times may vary. Each presentation is allotted eight minutes followed by another five minutes of discussion.*

Notes:

53. Early Failure of Tissue Valves Following Aortic Valve Replacement

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Authors: Nishant Saran, *Sameh Said, Kevin Greason, *John M. Stulak, *Simon Maltais, Alberto Pochettino, Richard Daly, *Joseph Dearani, *Hartzell Schaff

Author Institution(s): *Mayo Clinic, Rochester, MN*

Discussant: *Ravi K. Ghanta, *Baylor College of Medicine, Houston, TX*

Objectives: Bioprosthesis used for aortic valve replacement (AVR) are expected to last at least 8-10 years in adults. However, some bioprosthesis fail early (<5 years), and there are limited data on causes. Therefore, we reviewed our experience to identify modes of early failure requiring repeat AVR and possible associated risk factors.

Methods: From 1993 through 2012, 5,414 pt underwent AVR with a bioprosthesis (mean age 75.5±9.4 yr, 36.6%(n=1980) females). Repeat AVR within 5 years of index surgery was defined as early valve failure (EVF) (n=79, 1.5%). Proportional hazards model while censoring for death was used. A nested case-control study was performed. Patients with EVF(age 69.5±11 yr, 74.7%(n=59) males) were matched 1:2 to controls(age 69.6±10 yr, 74.7%(n=118) males) who had not had EVF and were living.

Results: The most common cause of EVF requiring repeat AVR was structural valve deterioration(SVD) in 38%(n=30), followed by infective endocarditis in 37%(n=29) and valve thrombosis 13%(n=10). Female gender (HR 0.60) and older age (HR 0.96) were protective, while cardiogenic shock at the time of index surgery (HR 10.05) was associated with EVF. SVD was seen in all implant types. Compared to porcine valves, Perimount (HR 0.40) and Trifecta (HR 0.46) pericardial valves had reduced risk of EVF while Mitroflow (HR 1.66) was associated with an increased risk(P<0.01). Valve thrombosis was observed in porcine(n=9) and Perimount valves(n=1). The nested case control study identified implant type (P=0.01) as the only significant predictor for EVF, with Mitroflow having the greatest chances of EVF (P=0.01).

Conclusions: EVF requiring repeat AVR can occur with SVD and infective endocarditis as the most common causes, and risk of SVD appears to be lower in the newer externally mounted pericardial valves. Further studies are required to evaluate valve thrombosis as a cause for EVF as this has an implication on the need for anti-coagulation post tissue valve implantation.

Notes:

54. Surgical Ablation of Atrial Fibrillation in Patients with Tachycardia-Induced Cardiomyopathy

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Authors: Ali J. Khiabani, Taylan Adademir, Matthew R. Schill, Laurie A. Sinn, Richard B. Schuessler, *Marc R. Moon, *Spencer J. Melby, ***D***Ralph J. Damiano

Commercial Relationships: *R.J. Damiano: Consultant/Advisory Board: Medtronic; Speakers Bureau/Honoraria: AtriCure, Edwards Lifesciences, LivaNova

Author Institution(s): *Washington University School of Medicine, St. Louis, MO*

Discussant: ***D***James R. Edgerton, *The Heart Hospital, Dallas, TX*

Commercial Relationships: *J.R. Edgerton: Speakers Bureau/Honoraria: AtriCure

Objectives: Atrial fibrillation (AF) is a common cause of tachycardia-induced cardiomyopathy (TIC). This study evaluated the outcomes of the stand-alone Cox-Maze IV procedure (CMP-IV) in this subset of patients at a single institution.

Methods: Between January 2002 and January 2017, 37 consecutive patients with ejection fraction (EF) ≤ 40% underwent a stand-alone CMP-IV. After ruling out patients with dilated and ischemic cardiomyopathies, 34 of 37 patients met the criteria for the diagnosis of TIC. Clinical data and echocardiogram reports were analyzed using descriptive statistics, chi-square, and paired Student's *t*-test.

Results: Seventy-seven percent (26/34) of the patients were male. The mean age was 56 ±11 years. Twenty-four patients (70%) had long-standing persistent AF. Median AF duration was 72 months. Seventeen patients (50%) had undergone at least one failed catheter-based ablation. Mean EF was 32%±8% and mean left atrial diameter was 48.7±9.8 mm. Eleven patients (32%) had NYHA Class III/IV symptoms. Freedom from atrial tachyarrhythmias was 94% and freedom from both atrial tachyarrhythmias and antiarrhythmic drugs was 89% at 12 months. EF was measured at a median 22 months postoperatively in 27/32 (82%) patients. The EF of this cohort improved to a mean of 55%±8% (95% CI [51%, 58%], P<0.001) (**figure**). Of the 11 patients with NYHA class III/IV symptoms, 8 patients were in class I/II at last follow up, P = 0.02.

Conclusions: Restoration of sinus rhythm with the Cox-Maze IV procedure was associated with significant improvement in ejection fraction in patients with AF and tachycardia-induced cardiomyopathy. This retrospective study illustrated the efficacy of the Cox-Maze procedure in this patient population both at restoring sinus rhythm and improving ventricular function. TIC should be strongly considered as an indication for proceeding with surgical ablation.

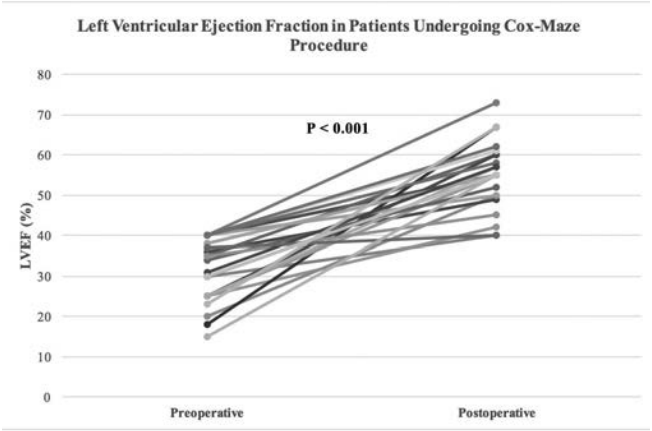

Figure – Improvement in left ventricular function in 27 patients with LVEF ≤40 after CMIV procedure.

Notes:

55. Impact of the Use of Novel Oral Anticoagulants Versus Warfarin on Rates of Postoperative Effusions After Coronary Artery Bypass Grafting

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Authors: Dishen Lin, Michael A. Catalano, Frank Manetta, Hugh Cassiere, Alan R. Hartman, Pey-Jen Yu

Author Institution(s): *Northwell Health, Manhasset, NY*

Discussant: ***D****Michael E. Halkos, *Emory University, Atlanta, GA*
Commercial Relationships: *M.E. Halkos: Consultant/Advisory Board: Medtronic

Objectives: The use of anticoagulants is associated with increased incidence of effusions following cardiac surgery. Novel oral anticoagulants (NOAC) have been shown to have comparable risk profiles and complication rates as compared to warfarin. However, data on use of NOACs in cardiac surgery patients is limited. The aim of this study is to compare postoperative effusion rates in patients who were anticoagulated with NOACs versus warfarin after coronary artery bypass grafting (CABG).

Methods: A retrospective review of 2017 patients undergoing isolated CABG from 2014 to 2017 was performed. Of those, 246 patients (12.2%) were placed on either an NOAC or warfarin postoperatively. The combined rates of postoperative pericardial and pleural effusions requiring invasive interventions during the index hospitalization and up to 3 months postoperatively were compared between patients who were placed on NOACs versus warfarin.

Results: Of the 246 patients placed on oral anticoagulation after isolated CABG, 64 (26.0%) were placed on NOACs and 182 (74.0%) received warfarin. There were no significant differences in preoperative coagulation profile and use of anticoagulation and antiplatelets preoperatively between the groups. Of the patients anticoagulated with NOACs postoperatively, 17 patients (26.6%) required invasive interventions for effusions as compared to 26 patients (14.2%) in the cohort anticoagulated with warfarin (p=0.035). Of the patients who required interventions for effusions, those on NOACs were more likely to require delayed interventions after hospital discharge as compared to those on warfarin (82.3% vs 34.6%, p=0.004).

Conclusions: Patients receiving NOACs after CABG are at increased risk of developing effusions requiring invasive interventions as compared to those receiving warfarin. This increased risk for should be taken into consideration when choosing the appropriate anticoagulation strategy for postoperative CABG patients.

Notes:

56. Extracorporeal Membrane Oxygenation Prior to Ventricular Assist Device Placement is a Risk Factor for Future Pump Thrombus

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Authors: ***D***Jordan Hoffman[1], **Navin Vigneshwar**[1], Christopher Pierce[2], Patrick Hosokawa[2], ***D***Joseph C. Cleveland[1]
Commercial Relationships: J. Hoffman: Research Grant: Colorado Clinical and Translational Sciences Institute (CCTSI); J.C. Cleveland: Research Grant: Abbott

Author Institution(s): [1]*University of Colorado, Denver, CO;* [2]*University of Colorado, Aurora, CO*

Discussant: *Mark S. Slaughter, *University of Louisville, Louisville, KY*

Objectives: With a frequency of up to 11% in contemporary literature, pump thrombus is a potentially devastating complication after ventricular assist device (VAD) implantation. We sought to determine the frequency of pump thrombus at our institution in patients who had previously been maintained on extra-corporeal membrane oxygenation (ECMO).

Methods: We reviewed the records of 225 patients undergoing VAD insertion from 2009-2017. Patients receiving ECMO prior to VAD implantation with complete medical records documenting the presence or absence of VAD pump thrombus were selected for analysis. When data were missing, frequency of various predictors was calculated by removing unknown occurrences from our calculations. VAD thrombus was confirmed with direct inspection during device explant. If treated without device explant, thrombus was diagnosed if an echogenic clot was seen on echocardiography, or signs and symptoms concerning for device thrombus were present. IRB approval was previously obtained for inclusion into our institutions database.

Results: The medical records of 222 patients with a VAD placed between 2009 and 2017 were reviewed. 38 of these patients received ECMO prior to VAD implantation. Of the patients who were bridged from ECMO to VAD, all had complete medical records documenting the presence or absence of VAD pump thrombus. 23.7% (9/38) of patients developed pump thrombus after having been bridged from ECMO to VAD. 10.9% (20/184) of patients who were not bridged to LVAD from ECMO developed pump thrombus. Patient demographics are shown in **table 1**.

Conclusions: The goal of this descriptive study was to determine the prevalence of pump thrombus in a small cohort of patients bridged from ECMO to VAD. Known major risk factors include age, number of medical comorbidities, inadequate anticoagulation, and hypercoagulable states. Pre-implant ECMO may represent an additional risk factor for VAD thrombus.

Demographics

Variable	No Thrombus (n = 29)	Thrombus (n = 9)	p-value
Gender			0.17
Male	24 (82.8%)	5 (55.6%)	
Female	5 (17.2%)	4 (44.4%)	
Age	54 (44-57)	47 (32-56)	0.24
Race			0.95
Caucasian	21 (72.4%)	7 (77.8%)	
African American	4 (13.8%)	2 (11.1%)	
Other	4 (13.8%)	1 (11.1%)	
BMI	26.8 (23.5-31.2)	30.8 (25.9-33.3)	0.29
Hypertension	16 (55.2%)	2 (22.2%)	0.13
Pulmonary Hypertension	4 (13.8%)	5 (55.6%)	0.02
Dialysis Dependent	2 (6.9%)	1 (11.1%)	0.68
Diabetes	4 (13.8%)	1 (11.1%)	0.84
Tobacco Use	14 (48.3%)	2 (22.2%)	0.25
Atrial Arrhythmia	10 (34.5%)	3 (33.3%)	0.95
Chronic Coagulopathy	2 (6.9%)	1 (11.1%)	0.68
History of HIT	1 (3.5%)	1 (11.1%)	0.42
INR	1.6 (1.3-1.9)	1.6 (1.3-2.5)	0.66
Peak LDH	512 (329-699)	457 (289-842)	0.49
Peak Plasma Free Hemoglobin	25.9 (7.6-81.9)	23.2 (22.6-53.5)	0.59
LV Decompression during ECMO	16 (55.2%)	2 (22.2%)	0.13
LV Function			0.66
30-39% (moderate)	1 (3.7%)	1 (12.5%)	
20-29% (moderate to severe)	2 (7.4%)	0 (0.0%)	
<20% (severe)	24 (88.9%)	7 (87.5%)	
RV Function			0.52
Normal	3 (12.5%)	1 (20%)	
Moderate	10 (41.7%)	3 (60.0%)	
Severe	11 (45.8%)	1 (20.0%)	

Notes:

57. Postoperative Supplementary Chemotherapy Could Not Improve Survival of Advanced ESCC Patients Underwent Surgery Following Neoadjuvant Chemotherapy

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Authors: Ke-Neng Chen, **Wanpu Yan**, Peiliang Zhao, Hao Fu, Yao Lin, Zhongwu Li, Liang Dai, Yongbo Yang, Xiaozheng Kang

Author Institution(s): *Peking University Cancer Hospital, Beijing, China*

Objectives: For locally advanced esophageal cancer, most European and Japanese guidelines recommend preoperative chemotherapy, whereas other western and Asian guidelines favor preoperative chemoradiotherapy. However, it remains unclear whether postoperative chemotherapy could improve the survival of esophageal squamous cell carcinoma (ESCC) patients with preoperative therapy followed by surgery.

Methods: We retrospectively reviewed 1,523 consecutive patients from a prospectively maintained database (2000- 2016), ESCC patients with neoadjuvant chemotherapy alone (NC) or perioperative chemotherapy (pre-, and post-operative chemotherapy, PC) were selected. Survival and toxicity in two group were analyzed after a Propensity Score Matching between the two groups.

Results: 270 patients were included, male is predominant (219/270, 81.1%) and the median age was 60. The follow-up rate and median follow-up were 92.6% and 38.6 months, respectively. Before matching, 72 patients in NC and 198 in PC. Gender (p= 0.029), age (p= 0.006) and Clavien-Dindo classification (p< 0.001) were statistically different between the two groups. After matching, 63 in NC and 112 in PC. The 5-y DFS and OS in NC group were not significant different from PC, (5-y DFS, 58.0% vs. 46.2%, p= 0.403; 5-y OS, 69.9% vs. 55.6%, p=0.227). COX regression model demonstrated that postoperative chemotherapy was neither the independent prognostic factor for DFS nor OS (HR= 1.071, 95%CI 0.656-1.747, p= 0.785 and HR= 1.340, 95%CI 0.733-2.452, p= 0.341). There were 7.1% (8/112) of the patients with PC had grade III or above toxicity.

Conclusions: Our results does not support to offer postoperative chemotherapy for locally advanced ESCC patients after 2 cycles of platinum-based chemotherapy followed by surgery.

Clinicopathologic Characteristics in NC and PC group before/ after Propensity Score Matching

Items	Before matching (n=270)			After matching (n=175)		
	NC (n=72)	PC (n=198)	p	NC (n=63)	PC (n=112)	p
Gender			0.029			0.746
Male	52 (72.2%)	167 (84.3%)		47 (74.6%)	86 (76.8%)	
Female	20 (27.8%)	31 (15.7%)		16 (25.4%)	26 (23.2%)	
Age			0.006			0.376
≤60	29 (40.3%)	117 (59.1%)		26 (41.3%)	54 (48.2%)	
>60	43 (59.7%)	81 (40.9%)		37 (58.7%)	58 (51.8%)	
Procedure			0.982			0.886
McKneown	59(81.9%)	161(81.3%)		50(79.4%)	92(82.1%)	
Ivor-Lewis	7(9.7%)	22(11.1%)		7(11.1%)	13(11.6%)	
Transhiatal	5(6.9%)	12(6.1%)		5(7.9%)	6(5.4%)	
Sweet	1(1.4%)	3(1.5%)		1(1.6%)	1(0.9%)	
No. of Lymph Node			0.508			0.426
≤15	29(40.3%)	71(35.9%)		24(38.1%)	36(32.1%)	
>15	43(59.7%)	127(64.1%)		39(61.9%)	76(67.9%)	
Pathological Stage			0.701			0.850
0	9(12.5%)	25(12.6%)		9(14.3%)	20(17.9%)	
1	11(15.3%)	20(10.1%)		9(14.3%)	12(10.7%)	
2	31(43.1%)	90(45.5%)		28(44.4%)	48(42.9%)	
3	21(29.2%)	63(31.8%)		17(27.0%)	32(28.6%)	
Response of Induction Chemotherapy			0.066			0.845
Major Response	28(38.9%)	54(27.3%)		24(38.1%)	41(36.6%)	
Minor Response	44(61.1%)	144(72.7%)		39(61.9%)	71(63.4%)	
Clavien-Dindo Classification			< 0.001			0.903
0	25(34.7%)	117(59.1%)		25(39.7%)	50(44.6%)	
1	12(16.7%)	34(17.2%)		12(19.0%)	21(18.8%)	
2	11(15.3%)	24(12.1%)		11(17.5%)	19(17.0%)	
3	24(33.3%)	23(11.6%)		15(23.8%)	22(19.6%)	

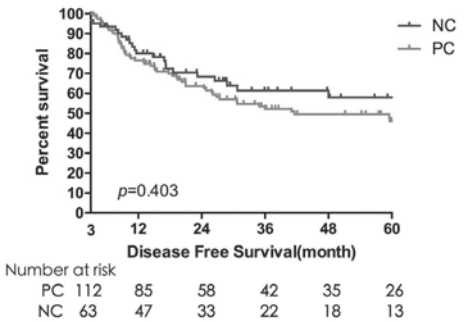

Figure 1. From landmark (3 months post-surgery) the 5-year Disease-Free Survival for NC(58.0%) versus PC group (46.2%). (p=0.403)

58V. Laparoscopic Repair of Paraconduit Herniation After Esophagectomy

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Authors: Tamar B. Nobel, Arianna Barbetta, Smita Sihag, *Manjit S. Bains, *David R. Jones, *Daniela Molena

Author Institution(s): *Memorial Sloan Kettering Cancer Center, New York, NY*

Objectives: Hiatal hernia after esophagectomy was a rare complication of open esophagectomy and was likely due to the opening of the diaphragmatic hiatus to improve exposure for mediastinal dissection of the esophagus and conduit transposition to the chest or neck. Since the introduction of minimally invasive techniques an increased incidence of this complication has been seen in association with a high morbidity rate after repair.

Methods: In this video we show the technique for a successful repair of such conditions.

Results:

The main steps of the procedure are:

-Reduction of the hernia in the abdomen

-Straightening of the gastric conduit

-Closure of the hiatus

-Fixation of the conduit to the crus

Conclusion: In our experience a transabdominal minimally invasive approach is preferred and successful in most cases and a transthoracic exposure is rarely needed.

Notes:

59. Predictors of Mediastinal Involvement After Neoadjuvant Chemoradiation in Adenocarcinoma of the Gastroesophageal Junction

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Authors: Kyle G. Mitchell, Naruhiko Ikoma, David Nelson, Dipen M. Maru, Jeremy J. Erasmus, *Ara Vaporciyan, *Mara B. Antonoff, *Reza J. Mehran, *David C. Rice, ***D***Jack A. Roth, *Stephen G. Swisher, *Boris Sepesi, *Garrett L. Walsh, Arlene Correa, Brian D. Badgwell, *Wayne L. Hofstetter
Commercial Relationships: J.A. Roth: Research Grant: Varian

Author Institution(s): *University of Texas, MD Anderson Cancer Center, Houston, TX*

Objectives: Adenocarcinoma of the gastroesophageal junction (AEG) poses a management challenge, as preoperative prediction of occult mediastinal nodal metastasis is difficult. We sought to identify factors predictive of mediastinal involvement among patients undergoing resection after neoadjuvant chemoradiation.

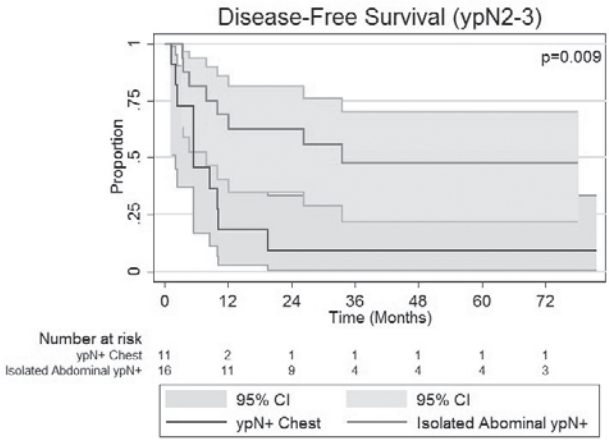
Methods: Patients undergoing trimodality therapy for Siewert II and III AEG at a single institution between 2000-2015 were identified. Mediastinal involvement was defined as ypN+ in mediastinal stations or mediastinal recurrence <2 years after resection. Maximal X2 analysis and Youden's index were used to identify the pretreatment proximal tumor extent that best discriminated mediastinal involvement.

Results: 204 patients [151 (74%) AEG II, 53 (26%) AEG III] met inclusion criteria, of whom 47 (23%) had clinical evidence of thoracic nodal disease. 31/204 (15%) met criteria for mediastinal involvement (24/31 ypN+, 10/31 mediastinal recurrence). Patients with mediastinal involvement had greater proximal tumor extent [median 2.0cm (IQR 2.0cm) vs 1.4cm (2.3cm),p=0.030] and were more frequently cN+ in the chest [13 (42%) vs 34 (20%),p=0.007]. On multivariable analysis of patients without clinical evidence of thoracic nodal disease, esophageal extent ↗1.5cm was independently predictive of mediastinal involvement (OR 5.46,p=0.011). Among patients with ypN2-3 disease, those with positive thoracic nodes had worse OS [14 months (CI 8-20) vs 39 months (CI 21-56),p=0.068] and DFS [6 months (CI 2-9) vs 34 months (CI 0-97),p=0.009] than those with isolated abdominal nodal involvement.

Conclusions: Persistent thoracic nodal disease is associated with poor outcomes after trimodality therapy for AEG. Proximal tumor extent is an independent predictor of mediastinal involvement among patients without clinical evidence of mediastinal metastasis and should be considered during the planning of radiation fields and operative approach.

Predictors of mediastinal involvement among patients with no clinical evidence of thoracic nodal disease (n=157)

Variable	OR	CI	p
Univariable Analysis			
Sex (M)*	4.10	0.52-32.16	0.180
Siewert (II)*	3.83	0.84-17.38	0.082
Pretreatment Tumor Length (cm)	1.06	0.88-1.28	0.551
Pretreatment Esophageal Extent (≥1.5 cm)*	6.39	1.77-23.09	0.005
Abdominal cN (cN+)*	1.69	0.62-4.61	0.307
Signet Ring Cell	0.53	0.15-1.94	0.339
Pretreatment SUV**	1.00	0.94-1.07	0.989
cT (cT3-4)	1.50	0.32-7.01	0.603
Differentiation (Poor)	1.75	0.59-5.20	0.310
Multivariable Analysis			
Pretreatment Esophageal Extent (≥1.5 cm)	5.46	1.49-20.10	0.011
Siewert (II)	3.48	0.74-16.44	0.116
Abdominal cN (cN+)	1.59	0.55-4.60	0.389
*Included in MVA; backwards selection until statistically significant or clinically meaningful **Available for 124 (79.0%)			



Disease-free survival for patients with ypN2-3 disease, by site of pathologic nodal involvement

Notes:

60. Performance of the Trans-Oral Circular Stapler for Thoracic Anastomosis After Induction Therapy for Advanced Esophageal Cancer

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Authors: Lily Wang, Steven Milman, Thomas Ng

Author Institution(s): *The Warren Alpert Medical School of Brown University, Providence, RI*

Objectives: Esophageal anastomosis may be at increased risk for leak in the setting of induction chemotherapy/radiation for esophageal cancer, with thoracic leaks potentially having significant morbidity. The outcomes of utilizing the trans-oral circular stapler for anastomosis have not been well studied in this patient population.

Methods: Patients with esophageal cancer undergoing induction therapy followed by Ivor Lewis esophagectomy were evaluated. The induction regimen delivered was carboplatin/paclitaxel, concurrent with 50.4Gy of radiation. Thoracic anastomosis was constructed with the trans-oral circular stapler in all patients, without buttress. Primary outcomes evaluated were the rates of anastomotic leak and stricture.

Results: Over 7 years, 87 consecutive patients were evaluated, 69(79%) were male, median age was 63 years, median BMI was 27kg/m2, and median age adjusted comorbidity index was 5. Median operative blood loss was 400cc and median operative time was 300 minutes. For postoperative outcomes, major complication (grade ↗3) was seen in 19(22%), including anastomotic leak in 2(2.3%), both successfully treated with temporary covered metal stent. Median hospital days was 10, there was no mortality at 30 days, and 1(1.2%) at 90 days due to cancer recurrence. The development of stricture was seen in 8(9.2%), with median time to dilation at 109 days and median number of dilation at 1. Univariate analysis found BMI to be significantly higher in patients with anastomotic leak vs those without, 43 vs 27kg/m2, p=0.002; the low number of leak events did not allow for multivariable analysis. For anastomotic stricture, no variables were found to be predictive of this outcome.

Conclusions: The use of the trans-oral circular stapler for thoracic anastomosis results in a consistent formation of the anastomosis, with low leak and stricture rates in the setting of induction chemotherapy/radiation. Leaks that do occur appear to be amendable to stent therapy.

Notes:

61. Comprehensive Valve Program in Patients With Congenital Heart Disease Undergoing Re-Entry Right Ventricular Outflow Tract Intervention in the Transcatheter Era: Review of Outcomes and Cost Analysis

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Authors: Joshua Kalish[2], Brendan Shafer[1], Lauren Mathis[1], Zahid Amin[2], ***Anastasios C. Polimenakos**[1]

Author Institution(s): *[1]Children's Hospital of Georgia, Augusta, GA; [2]Medical College of Georgia, Augusta, GA*

Discussant: Christopher J. Knott-Craig, *Le Bonheur Children's Hospital, Memphis, TN*

Objectives: Surgical pulmonary valve insertion(SPVI) for re-entry right ventricular outflow tract intervention (rRVOTI) remains gold standard. Fast-track in patients undergoing RVOTI of the comprehensive valve program targets early ICU and hospital discharge (Hd).Outcome and cost analysis was undertaken.

Methods: Between January 2014 and December 2016, 34 patients underwent reentry RVOTI. Seventeen had SPVI (14 valve only/3 conduit valve) and 17 TPVI (16 percutaneous and 1 hybrid).Surgical fast track included (1) intraoperative lung recruitment strategies and standardized anesthesia, (2) early mobilization and, (3) mediastinal drain removal. Echocardiographic evaluation preoperatively (TTE-1), after RVOTI (TTE-2), at hospital discharge (TTE-3) and follow-up(TTE-4) were obtained. Cost Analysis included procedural and hospital costs. Mean follow-up period was 11.3+/-6.9 months.

Results: All patients were extubated prior to ICU arrival. Mean age was 8.5+/-7.8 for SPVI [vs 28.5+/-8.6 years for TPVI] ($p<0.05$). There was no hospital mortality or 30-day readmission for SPVI (versus 1 mortality for TPVI).Mean hospital length of stay (LOS) was 4.1+/-1.1 days for SPVI [vs 1.1+/-0.7 days for TPVI] ($p<0.05$). Number of prior sternal reentry had no influence on outcome. RV systolic pressure referenced to LVSP (rRVSP, %) and diastolic dimension (RVEDDi, z-score) showed sustainable improvement (TTE-2, TTE-3, TTE-4) after RVOTI compared to TTE-1($p<0.05$).Mean total hospital cost was $54275.86+/-2503.91 lower after SPVI compared to TPVI; 21.7% cost reduction ($p=0.09$).

Conclusions: Patients undergoing RVOTI can be safely stratified, based on a customized concept, towards SPVI or TPVI. Standardized strategy can advocate a fast-track path. SPVI is associated with comparable mid-term outcomes to TPVI although SPVI is delivered in younger patients. Despite longer LOS SPVI is associated with reduced hospital cost. Multisite studies might help refining selection and facilitate benefit/cost ratio analysis.

Notes:

62. Role of Pulmonary Valve Z-Score in Valve-Sparing Surgical Repair of Tetralogy of Fallot - Systematic Review

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Authors: *Raina Sinha, Vasu Gooty, Subin Jang

Author Institution(s): *University of Minnesota, Minneapolis, MN*

Discussant: ***D****Christopher E. Mascio, *Children's Hospital of Philadelphia, Philadelphia, PA*
Commercial Relationships: *C.E. Mascio, Consultant/Advisory Board: HeartWare

Objectives: There is a lack of consensus regarding the smallest preoperative pulmonary valve (PV) z-score in tetralogy of Fallot/pulmonary stenosis (TOF/PS) patients to assure a valve-sparing repair. The aim of this study was to systematically collate and appraise the available evidence regarding the association between preoperative PV z-score and freedom from re-intervention on the right ventricular outflow tract (RVOT) for valve-sparing repair of TOF/PS.

Methods: PubMed, Embase, and Scopus databases were searched from their inception to March 2018. Studies reporting outcomes of TOF/PS patients following valve sparing repairs were selected for analysis. Preoperative patient characteristics, RVOT re-intervention (including surgical and catheter based) rates and follow up data were assessed. We excluded studies with TOF variants such as those with pulmonary atresia, major aortopulmonary collaterals, absent pulmonary valve, and atrioventricular septal defect, as well as cases with discontinuous pulmonary arteries or branch pulmonary artery stenosis.

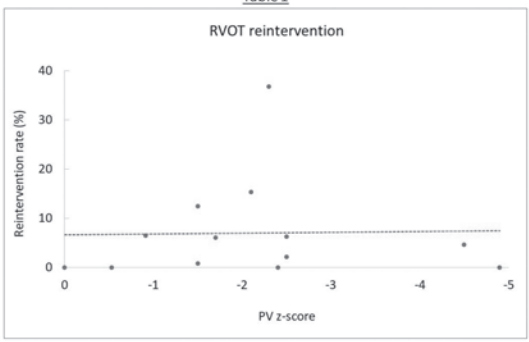
Results: Beginning with 712 screened citations, 14 studies involving valve-sparing TOF/PS repair met inclusion criteria. A total of 988 subjects had surgery at a median age and weight of 6.5 months and 6.9 kg respectively. The median preoperative PV z-score was -1.9 (0 – 4.9). There was a median follow-up of 29.1 months (16.8 – 164.4 months) with a median re-intervention rate of 4.7% (0 – 36.8%) as displayed in **Table 1**.

Conclusions: Available retrospective studies reveal substantial variability in preoperative PV z-scores of patients undergoing pulmonary valve sparing TOF/PS repair with overall low RVOT re-intervention rates (**Figure 1**). Hence, an aggressive approach favoring valve-sparing repair is feasible even with PV z scores ≤ -2, in order to avoid long term morbidities associated with the transannular patch repair of TOF/PS.

Table 1. Patient Demographics

Publication Patients (n)	Median Age (mos)	Median Pre-op PV Z score	RVOT reintervention rate (%)	Mean Follow-up (mos)
Stewart et al, 2005 (n=82)	9.4 ± 9 (mean)	-1.7	6.1	34
Boni et al, 2009 (n=24)	8.1	-1.5	12.5	32.8
Bove et al, 2011 (n=48)	7	-0.86	-	90
Hua et al, 2011 (n=111)	8.1 ± 3.2 (mean)	-1.5	0.9	27
Awori et al, 2012 (n=46)	6.5	-0.53	0	-
Bautista-Hernandez et al, 2012 (n=10)	5.5	-2.4	0	22
Sasson et al, 2012 (n=69)	36	0	0	23.2-26.4
Vida et al, 2012 (n=18)	3.1	-2.5	6.3	16.8
Ito et al, 2013 (n=11)	6.9	-4.9	0	31.2
Bartholomew et al, 2016 (n=46)	4.8	-0.91	6.5	94.8
Hickey et al, 2017 (n=296)	5.9	-4.5	4.7	164.4
Hofferberth et al, 2017 (n=162)	3.2	-2.1	15.4	36
Arafat et al, 2018 (n=46)	11	-2.5	2.2	46.2
Balasubramanya et al, 2018 (n=19)	0.5	-2.3	36.8	26.4

Table 1



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63V. Novel Approach to Repair of Tetralogy of Fallot With Absent Pulmonary Valve Syndrome and Severe Airway Compression

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Authors: Christina L. Greene, *Richard D. Mainwaring, Frank L. Hanley

Author Institution(s): *Stanford University, Stanford, CA*

Objectives: Tetralogy of Fallot (TOF) with absent pulmonary valve syndrome and massively dilated pulmonary arteries may present with severe airway compression. Neonates who present with severe airway compression are difficult to manage with a high mortality rate. The traditional approach of VSD closure and pulmonary artery plication is often insufficient to relieve severe airway compression. We present a new approach to relieving severe airway compression in TOF with absent pulmonary valve and massively dilated pulmonary arteries.

Methods: A 39-week-old, 3.2 kg male neonate, with TOF with absent pulmonary valve syndrome, and massively dilated pulmonary arteries presented with severe respiratory distress requiring immediate intubation. He was taken for operative repair at two days of life.

Results: The patient underwent four critical steps to alleviate his severe airway compression. 1) The VSD was closed to reduce the volume load on the heart. 2) The pulmonary arteries were plicated to reduce their size and relieve wall tension.3) A competent pulmonary valve was placed to eliminate the to and fro motion of the main pulmonary artery. 4) A Le Compte maneuver was performed to move the pulmonary artery away from the bronchus.

The patient underwent delayed sternal closure on POD # 7. He was extubated on POD # 11. The first oral feed was on POD # 22. The patient was discharged home on POD #34. He is currently at home on nasal cannula.

Conclusion: The traditional approach of VSD repair and pulmonary artery plication may not provide sufficient relief of airway compression in TOF with absent pulmonary valve syndrome and massively dilated pulmonary arteries. In this situation, two additional measures of placement of a competent pulmonary valve and a Le Compte maneuver may be utilized to improve airway compression and allow for extubation.

Notes:

64. Failure to Rescue in Humanitarian Congenital Cardiac Surgery

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Authors: *Tyler J. Wallen[1], Marci Fults[3], Randa Blenden[2], Janet Nwaukoni[3], Marilyn Le[3], Nuha Fariha[3], Rodrigo Soto[2]

Author Institution(s): *[1]The University of Florida, Gainesville, FL; [2]The International Children's Heart Foundation, Memphis, TN; [3]Philadelphia College of Osteopathic Medicine, Philadelphia, PA*

Discussant: William M. Novick, *University of Tennessee, Colliverville, TN*

Objectives: Cardiac surgeons have a significant history of participating in humanitarian work, however, the outcomes in this arena are not well delineated. We sought to define and describe failure to rescue in this setting by analyzing the outcomes of the International Children's Heart Foundation (ICHF), a non-governmental organization providing education and service to the developing world.

Methods: From 2008-2016, 3,783 patients underwent operations during the course of an ICHF mission. Of these, 1,454 (38.2%) patients suffered at least one complication. These patients were divided into those that ultimately died (FTR Group, n=147) and those who survived (Survivor Group, n=1307). Clinical presentation and outcomes were compared.

Results: The overall failure to rescue rate was 10.11%. Those in the FTR group were younger (2.62 vs. 5.92 years, p=<0.0001), smaller (78.84 vs. 95.24, p=<0.001), lighter (9.94 vs. 15.9 kg, p=<0.001), and had a lower preoperative SpO2 (79.44 vs. 86.95, p=<0.0001) than the Survivor group. Further, the FTR group was more likely to carry a diagnosis of transposition of the great arteries (TGA) (15.65% vs. 7.19%, p=0.001) but less likely to suffer from an atrial septal defect (1.36% vs. 7.32%, p=0.004) or a ventricular septal defect (8.16% vs. 18.82%, p=0.0009). Cardiopulmonary bypass times were longer in the FTR group (168.5 vs. 111.01, p=<0.0001). Reintubation (34% vs. 21.12%, p=0.0008) and reoperation (47.62% vs. 22.95%, p=0.001) also occurred with more frequency in the FTR Group (**Table 1**).

Conclusions: Failure to rescue occurs at a rate of 10.11% in the humanitarian congenital cardiac surgery setting. It is associated with young patients, a low preoperative SpO2, those who suffer from TGA and those patients requiring reoperation or reintubation.

	FTR (n=147)		Survivors (n=1307)		p
	N	%	N	%	
Age	2.62 +5.24		5.92 +0.54		<0.0001
Male	81	55.10%	693	53.02%	0.66
Height (cm)	78.84 +30.79		95.24 +34.34		<0.0001
Weight (kg)	9.94 +9.76		15.9 +14.8		<0.0001
SpO2 (%)	79.44 +16.64		86.95 +14.26		<0.0001
Underweight	56	38.10%	431	32.98%	0.23
PreOp ICU	15	10.20%	86	6.58%	0.12
ASD	2	1.36%	93	7.12%	0.004
VSD	12	8.16%	246	18.82%	0.0009
TET	28	19.05%	230	17.60%	0.65
TGA	23	15.65%	94	7.19%	0.001
DORV	12	8.16%	62	4.74%	0.11
Single Ventricle	12	8.16%	58	4.44%	0.06
CPB (min)	168.5 +183.3		111.01 +69.03		<0.0001
X-Clamp (min)	76.5 +47.7		61.4 +39.38		<0.0001
IntraOp Blood	56	38.10%	437	33.44%	0.27
Reintubation	50	34.01%	276	21.12%	0.0008
Reoperation	70	47.62%	300	22.95%	0.0001

Notes:

65. In-Hospital and 2-Year Outcomes Comparing TAVR Using Transcarotid, Transapical and Transaortic Access

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Authors: ***D*Keith B. Allen**[1], ***D***Adnan K. Chhatriwalla[1], David Cohen[1], Sanjeev Aggarwal[1], Zuhair Hawa[1], John Saxon[1], John R. Davis[1], Alex Pak[2], Zafir Hawa[2], Jim Mitchell[2], *A. Michael Borkon[1]
Commercial Relationships: K.B. Allen: Research Grant: Abbott, Edwards Lifesciences, Medtronic; Speakers Bureau/Honoraria: Edwards Lifesciences; A.K. Chhatriwalla: Speakers Bureau/Honoraria: Abbott Vascular, Edwards Lifesciences, Medtronic

Author Institution(s): *[1]St. Luke's Mid America Heart Institute, Kansas City, MO; [2]North Kansas City Hospital, North Kansas City, MO*

Objectives: To determine if TAVR using transcarotid (TC) access results in improved outcomes compared to transapical (TA) or transaortic (TAo).

Methods: From 1/2012 through 3/2018, 149 patients who underwent non-femoral TAVR using TC (n=68), TA (n=48) and TAo (n=33) access were retrospectively compared using pre-operative demographics and the STS/TVT risk calculators. In-hospital/30-day mortality and 1 and 2-year Kaplan-Meier survival rates along with LOS, blood product transfusion and discharge status were analyzed.

Results: Demographics are summarized in **Table 1**. Median PROM was similar between TC, TA and TAo access using the TVT [9.0% (IQR 6.7, 12.9) vs 8.8% (IQR 6.8,10.7) vs 10.0% (IQR 8.3, 12.1; p=0.1)] and STS [10.0% (IQR 7.0, 12.0) vs 9.1% (IQR 7.0, 11.7) vs 10.0% (IQR 85, 13.0; p=0.2)] risk calculators, respectively. TC patients, however, had more cerebral (p<0.001) and peripheral vascular (p=0.008) disease, more severe chronic lung disease (p=0.03) and more prior strokes (p=0.05). While TC compared to TA and TAo access had similar in-hospital mortality [2.9% (2/68) vs 2.1% (1/48) vs 6.1% (2/33); p=0.7], 30-day mortality [4.4% (3/68) vs 6.3% (3/48) vs 15.2% (5/33); p=0.2] and 30-day stroke rates [2.9%(2/68) vs 2.1%(1/48) vs 3.0%(1/33); p=0.9], TC access resulted in significantly better KM 1-year (94.4% vs 83.3% vs 69.7%; p=0.006) and 2-year survival (87.0% vs 77.0% vs 63.6%; p=0.014), respectively (**Figure 1**). TC access resulted in a shorter median LOS [3.0 days (IQR 2.0,5.0) vs 6.5 days (IQR 5.0, 9.5) vs 7.0 days (IQR 5.0, 9.0); p=<0.001], less patients transfused [4.4% (3/68) vs 54.2% (24/48) vs 51.5% (17/33); p=<0.001] and more patients discharged directly to home without home health care [95.5% (65/68) vs 47.9% (23/48) vs 42.4% (14/33); p<0.001].

Conclusions: TAVR using TC access compared to TA and TAo access is associated with shorter LOS, fewer transfusions, more frequent discharge to home and better 1 and 2-year KM survival.

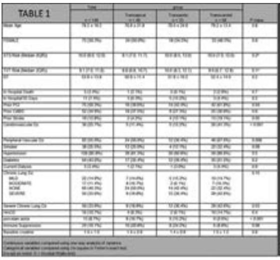
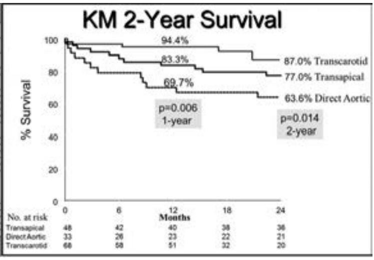


TABLE 1


KM 2-Year Survival
100
80
60
40
20
0
% Survival
94.4%
83.3%
69.7%
87.0% Transcarotid
77.0% Transapical
63.6% Direct Aortic
p=0.006
1-year
p=0.014
2-year
0
6
12
18
24
Months
No. at risk
Transapical 48 42 40 38 36
Direct Aortic 33 26 23 22 21
Transcarotid 68 58 51 32 20

Notes:

66. Prevalence of and Risk Factors for Permanent Pacemaker Implantation After Aortic Valve Replacement

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Authors: Melissa Levack, Samir Kapadia, *Edward Soltesz, ***D***A. Marc Gillinov, Penny Houghtaling, *Eugene Blackstone, Lars G. Svensson, Stephanie L. Mick
Commercial Relationships: A.M. Gillinov: Consultant/Advisory Board: Abbott, AtriCure, ClearFlow, Cryolife, Edwards Lifesciences, Medtronic; Ownership Interest: ClearFlow

Author Institution(s): *Cleveland Clinic, Cleveland, OH*

Discussant: Lorraine D. Cornwell, *Baylor College of Medicine, Houston, TX*

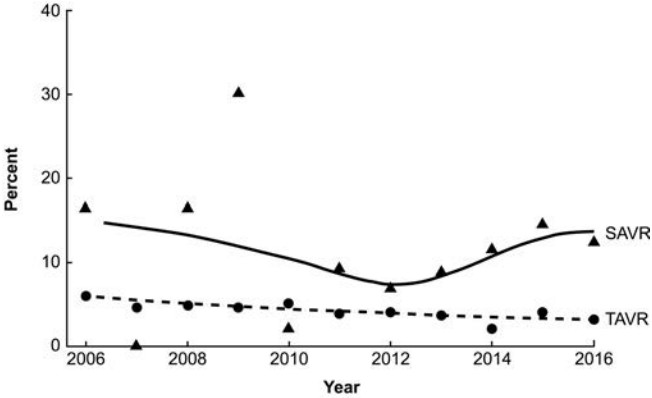
Objectives: Damage to the cardiac conduction system requiring permanent pacemaker implantation (PPI) is a known complication following aortic valve replacement (AVR). Associated morbidity from PPI has significant impact on quality of life. We investigated the prevalence of and risk factors for PPI at our institution in the SAVR and TAVR populations.

Methods: Preoperative variables and baseline electrocardiograms for 11,195 patients undergoing isolated SAVR ± coronary artery bypass grafting (CABG), n=9,903, or TAVR ± percutaneous coronary intervention, n=1,292, from 1996-2016 were reviewed. Patients with endocarditis, previous PPI, prior documentation of complete heart block, emergency surgery or other surgical procedures were excluded. Postoperative PPI rates were compared using the chi-square test. Risk factors for PPI were identified using multivariable logistic regression analysis.

Results: PPI prevalence was 6.0% overall for isolated SAVR, 7.3% for SAVR ± CABG, and 11% for isolated TAVR. PPI rate decreased from 13% to 3.1% for SAVR over the study period. From 2006 onwards, corresponding to the chronologic initiation of TAVR, the PPI rate for SAVR was 4.0%. (**Figure 1**) Risk factors for PPI after TAVR were preoperative conduction disturbances, type of valve (SAPIEN, 11%, SAPIEN XT, 7%, SAPIEN 3 12%, CoreValve, 31% and other TAVR, 11%), and left main stenosis. For PPI after SAVR, risk factors were preoperative conduction disturbances, older age and earlier date of operation; bicuspid valves, mechanical vs. bioprosthetic valves, STS risk score and concomitant CABG were not risk factors.

Conclusions: At a high volume institution in the current era, establishing a baseline for PPI rates is necessary. Preoperative conduction disturbances and valve type affect the rate of PPI. STS risk scores did not affect PPI rates. These data provide a benchmark that should be taken into account when considering TAVR in low-risk patients.

Figure 1. Temporal trend of permanent pacemaker implantation (PPI) after aortic valve replacement (AVR). From 2006 onwards, SAVR PPI rates remain relatively fixed whereas TAVR PPI rates have varied.



Notes:

67. Expanding TAVR Indications and the Impact Bicuspid Aortic Stenosis – An Outcomes Based Assessment

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Authors: Kristen A. Sell-Dottin, Jaimin R. Trivedi, *Mark S. Slaughter

Author Institution(s): *University of Louisville, Louisville, KY*

Discussant: ***D***S. Chris Malaisrie, *Northwestern University, Chicago, IL*
Commercial Relationships: S.C. Malaisrie: Consultant/Advisory Board: Cryolife, Edwards Lifesciences; Speakers Bureau/Honoraria: Abbott, Edwards Lifesciences; Other Research Support: Cryolife, Edwards Lifesciences, Vascutek

Objectives: Transcatheter aortic valve replacement (TAVR) procedures have increased following FDA approval for use in intermediate risk patients. As low and intermediate risk patients are increasingly considered for TAVR procedures, a larger percentage of patients have bicuspid aortic valves. Because bicuspid aortic stenosis (AS) patients were initially excluded from TAVR trials, there is limited data regarding outcomes of TAVR in these patients. We compare outcomes between bicuspid and tricuspid aortic valve patients undergoing TAVR.

Methods: Outcomes of 25 patients with bicuspid AS and 428 patients with tricuspid AS from a single institution were compared. Propensity score matching (1:2) was performed, resulting in 22 pairs of patients. Procedural and clinical outcomes were compared between the groups, using Valve Academic Research Consortium-2 (VARC-2) criteria.

Results: Patients with bicuspid AS were younger, had lower STS risk scores, and increased AV annular size compared to tricuspid AS patients. Procedural fluoro times and radiation doses were higher in the bicuspid group, but clinical outcomes were not significantly different between the two groups. In propensity-matched patients, again procedure times were longer, but mortality, major vascular complications, stroke, renal failure and need for pacemaker were equivalent. Peri-valvular leak was present in 5% bicuspid and 3% tricuspid patients (p=0.9). **Table 1** shows the baseline characteristics and outcomes of the patients in propensity-matched groups.

Conclusions: Bicuspid AS patients represent a subset of aortic stenosis patients with unique technical challenges related to TAVR. Despite these challenges and increased procedure times required for valve implantation, clinical outcomes in the propensity matched groups were not significantly different between the bicuspid and tricuspid AS groups. Appropriately selected intermediate and high-risk bicuspid AS patients should be reasonably considered for TAVR.

Baseline Patient Characteristics and Outcomes for Bicuspid vs. Tricuspid Valve patients undergoing TAVR

Baseline Factor	Bicuspid	Tricuspid	p
Sample size (2013-2017)	22	41	
Age (years)	69.9+/-11.9	70.5+/-12.5	0.9
Gender female	36%	32%	70%
BMI	29.0+/-9.6	30.6+/-7.1	0.2
AV area (cm^2)	0.9+/-0.8	0.8+/-0.3	0.9
AV annular size (mm)	25.7+/-2.5	24.6+/-2.3	0.07
AV mean gradient	37.1+/-8.3	37.0+/-14.8	0.9
AV peak velocity (m/s)	3.9+/-0.6	4.0+/-0.9	0.5
LVEF (%)	48.6+/-16.4	50.1+/-15.8	0.5
Previous CABG	22%	17%	0.70
Previous PCI	32%	32%	0.01
Chronic lung disease >mild	41%	38%	0.40
Creatinine	1.12 (1-1.6)	1.14 (0.9-1.5)	0.6
KCCQ	36.8+/-22.3	43.6+/-24.0	0.3
STS risk	7.0+/-5.1	6.9+/-5.1	0.8
Outcomes variables			
Mortality	8%	3%	0.2
Major vascular injury/bleed	9%	9.70%	0.9
Stroke	0	0	1
Discharge home	85%	85%	0.7
Renal failure	0	2%	1%
Pacemaker requirement	9%	9.70%	0.9
ICU stay	23 (0-36)	7.7 (0-26)	0.5
Fluoroscopy time (min)	19.1+/-11.8	13.9+/-7.7	0.05
Radiation (mrad)	1305 (372-1949)	563 (361-1017)	0.03
PVL	5%	3%	90%

AV area - aortic valve area; LVEF - left ventricular ejection fraction; PVL - perivalvular leak.

Notes:

68. Does the Integrated Risk Assessment by the Heart Team Predict Outcomes After Transcatheter Aortic Valve Replacement (TAVR)?

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Authors: Michael A. Catalano, Dishen Lin, ***D***Bruce Rutkin, Rick A. Esposito, Gregory Maurer, Alan R. Hartman, Pey-Jen Yu
Commercial Relationships: B. Rutkin: Consultant/Advisory Board: Medtronic

Author Institution(s): *Northwell Health, Manhasset, NY*

Discussant: *Danny Chu, *UPMC Heart & Vascular Institute, Pittsburgh, PA*

Objectives: Consideration for Transcatheter Aortic Valve Replacement (TAVR) necessitates an integrated risk assessment by members of the Heart Valve Team. The utility of the integrated risk assessment for predicting TAVR outcomes is not established. The objective of this study is to compare utility of the integrated risk assessment to that of the Society of Thoracic Surgeons Predicted Risk of Mortality (STS-PROM) score for predicting patient outcomes after TAVR.

Methods: A total of 274 patients who underwent TAVR from 1/2016 to 10/2017 were included in this study. Patients were deemed intermediate or high risk by two surgeons on the Heart Valve Team based on an integrated risk assessment that incorporates the STS-PROM score, fragility measures, end-organ dysfunction, and surgeon evaluation. Patients were also deemed low, intermediate, or high risk based solely on their STS-PROM scores of <3%, ↗3% to <8%, and ↗8%, respectively. Differences in postoperative outcomes between intermediate and high risk groups as categorized by the integrated risk assessment versus STS-PROM were compared.

Results: Of the 274 patients, 70 patients were identified as intermediate risk and 204 patients were identified as high risk based on the integrated risk assessment by the Heart Team. STS-PROM identified 34 patients as low risk, 178 patients as intermediate risk, and 62 patients as high risk within the same cohort. There were no statistically significant differences in postoperative outcomes between patients who were deemed high versus intermediate risk by the integrated risk assessment. In contrast, postoperative complication rates, rate of operating room extubation and postoperative ventilation hours were significantly higher in patients deemed high risk as compared to intermediate risk by STS-PROM (**Table 1**).

Conclusions: Integrated risk assessment by the Heart Valve Team is not superior to STS-PROM in predicting postoperative outcomes in patients undergoing TAVR.

Patient Outcomes by Heart Valve Team Risk Stratification, and STS-PROM

	Risk Stratification		
	Intermediate	High	p-value
Integrated Risk Assessment by Heart Team			
Total Patients, n	70	204	
Patient Death (%)	1 (1.43%)	3 (1.47%)	1.000
OR Extubation (%)	60 (85.71%)	155 (75.98%)	0.094
Total Ventilation Hours (Median)	2.00	4.00	0.222
Total Complications/Death (%)	3 (4.29%)	14 (6.86%)	0.573
STS-PROM Risk Stratification			
Total Patients, n	178	62	
Patient Death (%)	2 (1.12%)	2 (3.23%)	0.275
OR Extubation (%)	148 (83.15%)	37 (59.68%)	<.001
Total Ventilation Hours (Median)	3.00	6.00	0.004
Total Complications/Death (%)	6 (3.37%)	10 (16.13%)	0.002

Notes:

69. One Hundred and Counting: Dr. Dwight C. McGoon's Enduring Legacy

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Authors: Pouya Hemmati, Arman Arghami, *Joseph Dearani, Richard Daly, *Hartzell Schaff

Author Institution(s): *Mayo Clinic, Rochester, MN*

Body of History Abstract: Dr. Dwight C. McGoon, a prolific surgeon at the Mayo Clinic, achieved an amazing feat during the early days of cardiac surgery. In 1965, before the era of cardioplegia, he reported a series of 100 consecutive aortic valve replacements with no in-hospital mortality. Over 50 years later, Dr. McGoon is still remembered for his technical mastery and innovative contributions to his field.

Dr. McGoon was born in Marengo, IA, on March 24th, 1925. He stayed in his home state to attend Iowa State University and St. Ambrose College. After receiving his medical degree from Johns Hopkins University, he began training under Dr. Alfred Blalock from 1948 to 1954. He then served in the United States Air Force until 1956, when he began a one-year surgical fellowship at the Mayo Clinic. Dr. Blalock had "an unrealized ambition" for one of his residents to join the Mayo Clinic staff. He believed Dr. McGoon could fulfill this desire.

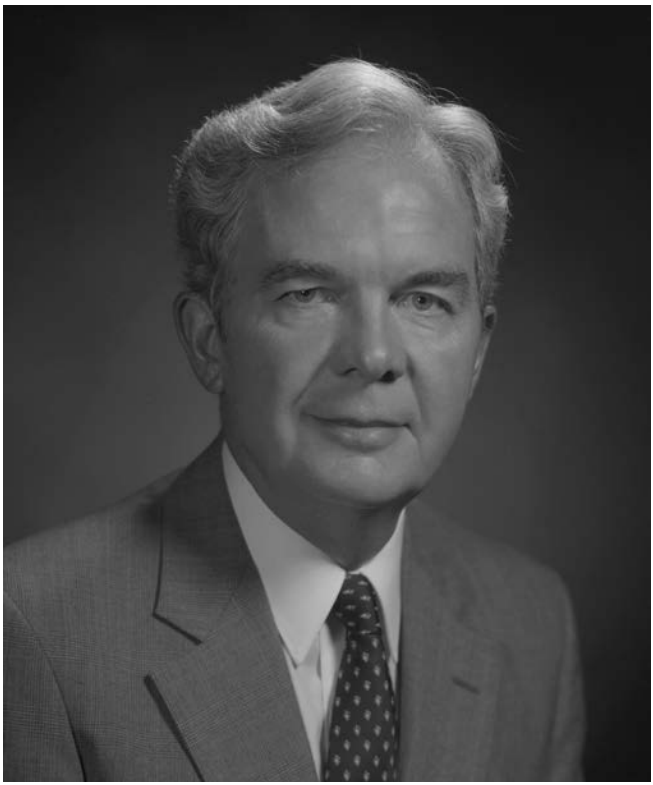
As predicted, Dr. McGoon stayed in Rochester, MN, to work with Drs. O.T. (Jim) Clagett and John W. Kirklin. He became a pioneer in both adult and congenital cardiac surgery. He first described surgical repairs for mitral valve regurgitation in the setting of ruptured chordae and for ruptured aortic sinus. Other contributions included novel uses of left ventricular and biventricular extracardiac conduits and describing repairs for transposition of the great arteries, truncus arteriosus, pulmonary stenosis, and pulmonary atresia.

Another extraordinary achievement was his published series of 100 consecutive aortic valve operations (February 1963-December 1964) with no in-hospital mortality. Nearly all of the patients were experiencing "significant and progressive disability secondary to their aortic valve disease." Using a combination of nitrous oxide, halothane, and succinylcholine for anesthetics, he reported that patients were extubated in the operating room.

Dr. McGoon utilized the Mayo-Gibbon pump-oxygenator for cardiopulmonary bypass and hypothermia to 30 degrees Celsius. He used direct cannulation of the right and left main coronary ostia with "O-ring" and automatically inflating cuffed cannulas, respectively, with separate pumps for independent blood flow rates through each coronary. In 6 instances, he individually cannulated the left main coronary branches with small cuffed cannulas because the bifurcation was within 5 mm of the origin.

The Starr-Edwards aortic ball-valve was used in all but one case, when "a Magovern-Cromie valve was chosen because, due to mechanical failure in the pump-oxygenator, unusual haste was necessary for completion of the procedure." The operative technique involved 30 to 40 simple interrupted 2-0 silk sutures (2-3 mm apart). He stated that the number of sutures may explain the "near absence of diastolic murmurs postoperatively," referring to absence of paravalvular leaks. Only 2 patients required medical treatment to increase postoperative cardiac output (with epinephrine or digitalis) and 7 were given diuretics. Three patients required reoperation for cardiac tamponade and 2 postoperative myocardial infarctions were noted. These outcomes were remarkable given the available technology in the early 1960s.

Dr. McGoon's distinguished career included positions as the Mayo Clinic Head of Thoracic and Cardiovascular Surgery (1968-1978), Vice President of Mayo Clinic Staff (1968), President of the American Association for Thoracic Surgery (1983-1984), and Editor-in-Chief of the Journal of Thoracic and Cardiovascular Surgery (1977-1987). Despite a diagnosis of Parkinson's disease that hindered his ability to operate after 1979, he was involved in surgical education and hospital affairs until retiring in 1990. He passed away on January 27, 1999. He was revered for his technical prowess, innovation, and humanism. One of his contemporaries, Dr. Russell M. Nelson, described him as "always a gentleman, always humble, always considerate; he looked for ways to build up the people around him."



Dr. Dwight C. McGoon (used with permission from the Mayo Clinic Archives)

Notes:

*2:55 pm – 3:08 pm
Magnolia Ballroom A-C

B-V4. Novel Cannulation Technique for Temporary Right Ventricular Assist Device After LVAD Placement

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Authors: William Z. Chancellor, Jared P. Beller, Emily A. Downs, *Leora Yarboro

Author Institution(s): *University of Virginia, Charlottesville, VA*

Regulatory Disclosure: This presentation describes the off-label use of the Centrimag Ventricular Assist Device.

Moderator: ***D***Michael Z. Tong, *Cleveland Clinic, Cleveland, OH*
Commercial Relationships: M.Z. Tong: Consultant/Advisory Board: Abbott, ABIOMED

Objectives: Right ventricular (RV) failure is a life-threatening complication after left ventricular assist device (LVAD) implantation. Increasingly, temporary right ventricular assist devices (RVAD) are used to support postoperative right heart failure and cardiogenic shock. Typically, temporary RVAD placement is limited by the need for delayed sternal closure, reoperative sternotomy for removal, or restricted patient mobility due to a femoral venous catheter.

Methods: We describe a novel technique for the placement of a temporary RVAD that does not rely on femoral central venous access and can be discontinued using conscious sedation and local anesthetic.

Results: A durable LVAD is placed through a median sternotomy after initiation of central cardiopulmonary bypass. In the case of RV failure, an 8mm Dacron graft is anastomosed to the main pulmonary artery and a 14mm Dacron graft is sewn to the right atrial appendage. The conduits are then tunneled out through the skin between the 2rd and 3th rib spaces bilaterally. Cannulae for the extracorporeal RVAD are then placed through the conduits using echo guidance for optimal positioning. Cardiopulmonary bypass is weaned as both VAD flows are titrated, and the sternum is closed in the standard fashion. Patients are transported to the ICU where they are extubated and vasoactive infusions are weaned as tolerated. Patients are mobilized and begin physical rehabilitation on postoperative day 1. When right ventricular support is no longer required the cannulae are removed using minimal sedation and local anesthetic.

Conclusion: We report a novel technique for temporary right ventricular support after LVAD placement that allows for early patient mobilization and can be discontinued in the ICU.

**Please note: This break is scheduled from 2:45 pm-3:30 pm. These video abstract presentations will begin approximately ten minutes after the scheduled break time has begun to allow for attendees to transition from the general session rooms into the Exhibit Hall. *Actual presentation start times may vary. Each presentation is allotted eight minutes followed by another five minutes of discussion.*

Notes:

70. Novel Preoperative Huddle Email Improves Perioperative Efficiency

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Authors: *Zachary M. Tyerman, *James H. Mehaffey, *Robert B. Hawkins, *Leora Yarboro, ***D***Gorav Ailawadi, *Nicholas R. Teman
Commercial Relationships: *G. Ailawadi: Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic

Author Institution(s): *University of Virginia, Charlottesville, VA*

Discussant: *Thoralf M. Sundt, *Massachusetts General Hospital, Boston, MA*

Objectives: Uncertainty regarding operative plans and medications/equipment needed for cardiac surgical operations can delay on-time starts and inhibit efficient physician workflow. To address this, we created a nightly "Huddle" email sent to all staff involved in patient care (OR nursing, anesthesia, perfusion, ICU, etc.), detailing critical information about the next day's operations (**Figure**). The purpose of this study was to evaluate the impact of the Huddle email on perioperative efficiency.

Methods: A total of 1,165 first start, elective, cardiac surgery (CABG and/or valve) cases from 2012 and 2017 in a tertiary institutional database were stratified by era (Pre-Huddle: 07/2012-06/2015 vs Huddle: 07/2015-06/2017) and preoperative risk (PROMM). Only open cases were included. LVAD, TAVR, and emergent procedures were excluded. Differences between scheduled start to in-room time, in-room to incision time and total OR minutes were analyzed using the Wilcoxon rank-sum test.

Results: A total of 668 Pre-Huddle and 497 Huddle cases met criteria and were analyzed. Preoperative risk was similar between eras (PROMM: Pre-Huddle 14.7% [IQR:8.9-26.1] vs Huddle 15.3% [IQR:9.7-23.2] p=0.4205). After the implementation of the Huddle, arrival to the operating room was 3 minutes earlier (9 min delayed Pre-Huddle [IQR: 4-15] vs Huddle 6 min [IQR:2-11] p<0.0001). Despite being in the room earlier, the time to incision was longer (70 min [IQR:62-80] vs 72 min [IQR:66-82] p=0.0002), as was OR minutes utilized (367 min [IQR: 318-426] vs 391 min [IQR: 347-439], p<0.0001) likely due to an increase in less experienced trainees performing components of the operation.

Conclusions: Implementation of a novel preoperative huddle email significantly improved in-room time for elective cardiac operations and greatly increased overall team satisfaction. Strategies involving other aspects of the perioperative process should be explored to develop comprehensive operative efficiency efforts.

Figure: Huddle Email Example:

Mr. XXX is a 65-year-old male with: CAD, Afib s/p ablation and septal hypertrophy with dynamic LVOT obstruction. **Operative Plan:** CABG x 2-3 (LIMA to LAD, SVG to Ramus, Possible SVG to either PDA or OM). Left atrial appendage ligation. Possible septal myectomy. **Consent Considerations**: Please ensure listed as appendage ligation and possible myectomy. **Bypass**: Central cannulation. Antegrade. Retrograde. (LV Vent if doing myomectomy). **Imaging**: TEE intra-op to decide about myectomy. **Equipment**: Left atrial appendage clip applier and measuring stick. Double sternal wires and plating system. Single shaft instruments, skin hooks, valve instruments for myomectomy. **Dressings**: Standard

Notes:

71. Lung Cancer Patient Perceptions of the Value of an Outreach Thoracic Surgical Clinic

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Authors: Zoya Mohammad, Kyle G. Mitchell, David Nelson, Courtney Robb, Claudine Jreissaty, Janet Tu, *Mara B. Antonoff

Author Institution(s): *University of Texas, MD Anderson Cancer Center, Houston, TX*

Discussant: Scott M. Atay, *University of Southern California, Keck School of Medicine, Los Angeles, CA*

Objectives: While outreach clinics in some specialties have been associated with improved outcomes and access to care, their role for patients with non-small cell lung cancer (NSCLC) has not been described. We sought to characterize NSCLC patient perceptions of the utility of such a clinic.

Methods: Surveys were administered to patients with NSCLC seen at an outreach thoracic surgery clinic located approximately 20 miles from a major cancer center. Completed surveys were reviewed from patients who were first evaluated between 2016-2018.

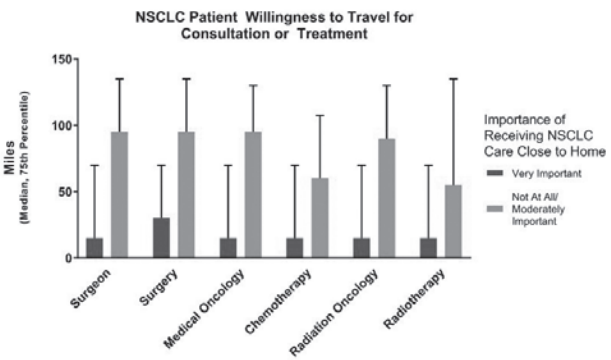
Results: 69 patients, who lived a median distance of 43.5 miles (IQR 106.3) from clinic, completed surveys (**Table 1**). Patients traveling ↗50 miles were more likely to cite physician expertise as a benefit of treatment at the clinic (84.4% vs 69.7%, p=0.160) and to be willing to travel ↗100 miles for surgery (71.0% vs 26.7%, p=0.001) or consultation with a surgeon (71.0% vs 25.8%, p<0.001). Patients seeking expert physicians were more willing to travel to main campus for consultation with medical oncologists (77.6% vs 57.1%, p=0.174), radiation oncologists (77.6% vs 50.0%, p=0.090), and surgeons (83.7% vs 64.3%, p=0.141) as well as for radiation therapy (75.5% vs 42.9%, p=0.047). Patients for whom it was very important to receive care close to home were less willing to travel ↗100 miles for consultation [surgeon (33.3% vs 65.6%, p=0.011); medical oncologist (33.3% vs 65.6%, p=0.011); radiation oncologist (33.3% vs 64.5%, p=0.015)] and for treatment [surgery (33.3% vs 65.6%, p=0.011); chemotherapy (36.7% vs 60.7%, p=0.067); radiotherapy (33.3% vs 64.3%,p=0.018)] (**Figure 1**).

Conclusions: A plurality of surveyed patients highly value receiving oncologic care close to home and are more sensitive to distance required to travel for recurring treatments. Outreach clinics may provide a benefit for NSCLC patients in the settings of initial consultation, preoperative, and postoperative care.

Table 1

Variable	n(%)*
Sex	
F	40 (58.0)
M	29 (42.0)
Median (IQR) of age in years	69.0 (16.0)
Median (IQR) of distance traveled to clinic in miles	43.5 (106.3)
How important is it to receive lung cancer care close to home?	
Not at all	8 (11.8)
Moderately	27 (39.7)
Very	33 (48.5)
How many miles would you be willing to travel for the following? (median, IQR)	
Consultation with medical oncologist	47.5 (86)
Consultation with radiation oncologist	45.0 (88)
Consultation with thoracic surgeon	47.5 (86)
Chemotherapy	40.0 (90)
Radiation therapy	32.5 (90)
Surgery	50.0 (80)
Referral Method	
Advertisement	5 (7.4)
Outside physician	28 (41.2)
Internal referral	25 (36.8)
Friend	10 (14.7)
Internet	0 (0.0)
Perceived benefits of getting treated at an outreach clinic	
Physician expertise	52 (75.4)
Close to home	28 (40.6)
Reduced traffic	18 (26.1)
Free parking	17 (24.6)
Other	1 (1.4)
*All percentages given as % of eligible responses	

Figure 1



72. Response to Neoadjuvant Treatment for Esophageal Cancer May Predict Increased Incidence of Brain Metastases Compared to Other Metastasis Sites

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Authors: Tamar B. Nobel[1,2], Nikita K. Dave[3], Arianna Barbetta[1], Smita Sihag[1], *David R. Jones[1], *Daniela Molena[1]

Author Institution(s): *[1]Memorial Sloan Kettering Cancer Center, New York, NY; [2]Mount Sinai Hospital, New York, NY; [3]Rutgers New Jersey School of Medicine, Newark, NJ*

Discussant: *Wayne L. Hofstetter, *University of Texas, MD Anderson Cancer Center, Houston, TX*

Objectives: Recurrence often occurs in patients with esophageal cancer (EC) despite definitive treatment. Brain metastases after esophageal carcinoma (BMEC) are rare and thus not regularly screened for in recurrence surveillance. Risk factors and prognosis of BMEC compared to other sites of recurrent disease remain undefined.

Methods: A retrospective review was performed of all patients with esophageal carcinoma who underwent esophagectomy at a single institution between 1995 and 2017 to identify patients with clinical Stage I-III who developed metastasis. Patients with BMEC (n=54) were compared to other metastasis sites (n=704). Continuous variables were compared with the Mann Whitney U test and categorical with Fisher's exact test. Multivariate analysis was performed using logistic regression to predict BMEC and Cox Proportional Hazards for survival.

Results: Patients characteristics and comparison between patients with BMEC and other metastasis sites are presented in **Table 1**. On multivariable analysis, patients with BMEC were more likely to have pathologic complete response (pCR) (OR 3.4 95% CI 1.7-6.8) and have received neoadjuvant treatment (OR 3.9, 1.4-11.2). Median disease-free survival did not differ significantly between the 2 groups (11.2 BMEC vs 10.7 other, p>0.05). Overall survival was lower in the BMEC group (7.5 months vs 10.6, p=0.012). When controlling for neoadjuvant treatment and pathologic stage, risk of death was 75.9% higher in patients with BMEC than with other metastasis sites (p<0.0001).

Conclusions: Patients who receive neoadjuvant therapy, and particularly patients achieving pCR, may benefit from being regularly monitored for brain metastasis. Patients with BMEC have worse prognosis than patients with metastasis at other sites.

Table 1. Comparison of clinicopathologic factors between patients with BMEC and other metastasis sites.

	No Recurrence (n=225)	Recurrence (n=31)	p value
Age (Mean ± SD)	64.2 (10.4)	63 (10.2)	0.83
Signet Cell, n (%)	20 (8.9)	7 (22.6)	0.02
Smoker, n (%)	171 (73.7)	21 (67.7)	0.52
T Stage (%) 1 2	 205 (88.4) 27 (11.6)	 23 (74.2) 8 (25.8)	 0.029
Grade (%) 1 2 3	 43 (20) 119 (55.3) 53 (24.7)	 1 (3.2) 15 (48.4) 15 (48.4)	 0.007
Vascular Invasion, n(%)	38 (17)	9 (30)	0.129
Size (cm) (Mean ± SD)	1.7 (1.5)	2.4 (1.5)	0.029
Pathologic Barrett's, n(%)	204 (89.1)	24 (77.4)	0.079

Notes:

73. A 25-Year Experience With the Ross Procedure in Children

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Authors: *Damien J. LaPar[1,2], Eliana Al Haddad[1], *Paul Chai[1,2], David Kalfa[1,2], Amee M. Shah[1], Maria Thanjan[3], Patrick Flynn[2], Jan M. Quaegebeur[1], Emile A. Bacha[1,2]

Author Institution(s): *[1]Columbia University College of Physicians and Surgeons, New York, NY; [2]Weill Cornell College of Medicine, New York, NY; [3]New York Presbyterian Hospital, New York, NY*

Discussant: *John W. Brown, *Indiana University School of Medicine, Indianapolis, IN*

Objectives: The Ross procedure remains the gold standard surgical therapy for severe aortic valve dysfunction in children. With the emergence of evolving surgical techniques for aortic valve disease and transcathether-based valve technology, defining true long-term outcomes for the Ross procedure in pediatric patients remains critical to provide important surgical benchmarks for this patient population.

Methods: All pediatric patients (age < 18 years) undergoing the Ross procedure for severe aortic valve dysfunction were evaluated over a 25-year study period (1993-2018). Patients were stratified by age: I (age < 1y), II (age 1-10y), and III (age 11-17y). Univariate and Kaplan-Meier analyses evaluated operative and long-term outcomes.

Results: A total of 131 pediatric patients underwent the Ross procedure. Mean age was 8±6yr (median 9yr, range <1-17)), including 29 patients (22%) < 1yr, 50 patients (38%) age 1-10yr, and 52 (40%) age 11-17yr. Long-term follow-up was 100% (mean 5±7yr, range <1-21yr). The Ross-Konno procedure was performed in 37% of patients, while 63% underwent Ross procedure alone. A pulmonary homograft RV-PA conduit was utilized in the majority (85%) of cases, compared to aortic homograft (11%) and xenograft (4%). Overall operative mortality was 2% and was highest among infants (7%). Importantly, Kaplan-Meier long-term survival (**Figure**) was high across age groups: I (93% at 17 years follow-up), II (97% at 20 years follow-up), and III (100% at 19 years follow-up). Freedom from autograft reintervention at 5, 10- and 15 years was 94%, 86%, 73%, respectively.

Conclusions: Operative and long-term results for the Ross procedure in children are promising with high survival and long-term durability of the neo-aortic autograft. Neonates and infants undergoing the Ross procedure remain the highest risk pediatric cohort. These long-term data provide critical benchmarks to which future surgical therapy and emerging technology should be compared.

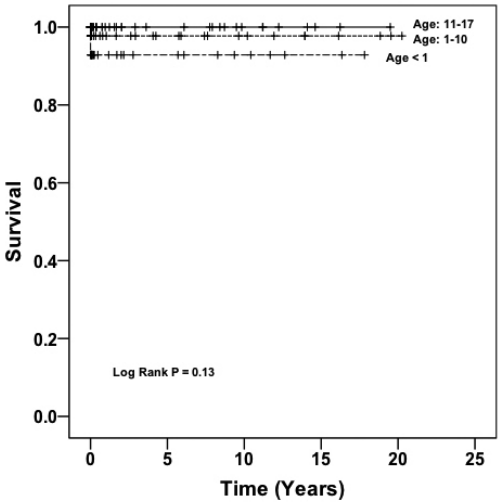


Figure: Kaplan-Meier estimate for long-term survival by age group following the Ross procedure among children < 18 years of age.

Notes:

PAST MEETINGS AND AWARDS

PAST MEETINGS

	PRESIDENT	SECRETARY
1954—Hollywood Beach, FL	James D. Murphy*	Hawley H. Seiler*
1955—White Sulphur Springs, WV	Paul W. Sanger*	Hawley H. Seiler*
1956—Miami Beach, FL	Donald L. Paulson*	Hawley H. Seiler*
1957—New Orleans, LA	Duane Carr*	Hawley H. Seiler*
1958—Miami Beach, FL	John S. Harter*	Hawley H. Seiler*
1959—Edgewater Park, MS	Edward F. Parker*	Hawley H. Seiler*
1960—Nassau, Bahamas, B.W.I.	Edgar W. Davis*	Hawley H. Seiler*
1961—Memphis, TN	DeWitt C. Daughtry*	Hawley H. Seiler*
1962—Ocho Rios, Jamaica	James E. Dailey*	Hawley H. Seiler*
1963—San Antonio, TX	Lewis H. Bosher	Hawley H. Seiler*
1964—Atlanta, GA	Robert G. Ellison*	Hawley H. Seiler*
1965—Freeport, Grand Bahama	Francis H. Cole*	Hawley H. Seiler*
1966—Asheville, NC	Will C. Sealy*	Hawley H. Seiler*
1967—Dallas, TX	Edward R. Munnell*	Hawley H. Seiler*
1968—San Juan, Puerto Rico	Milton V. Davis*	Hawley H. Seiler*
1969—Washington, DC	Osler A. Abbott*	James W. Brooks*
1970—Bermuda	Watts R. Webb	James W. Brooks*
1971—Tampa, FL	Hawley H. Seiler*	James W. Brooks*
1972—Port of Spain Trinidad and Tobago	A. Robert Cordell*	James W. Brooks*
1973—Louisville, KY	James W. Pate	James W. Brooks*
1974—Williamsburg, VA	Bertram A. Glass*	James W. Brooks*
1975—New Orleans, LA	Frederick H. Taylor*	J. Kent Trinkle*
1976—Acapulco, Mexico	James W. Brooks*	J. Kent Trinkle*
1977—Marco Island, FL	Joseph W. Peabody, Jr.*	J. Kent Trinkle*
1978—Marco Island, FL	Robert Carr*	J. Kent Trinkle*
1979—San Antonio, TX	Harold C. Urschel Jr.*	Richard B. McElvein
1980—White Sulphur Springs, WV	W. Glenn Young Jr.*	Richard B. McElvein
1981—Palm Beach, FL	Dennis Rosenberg*	Richard B. McElvein
1982—Hilton Head Island, SC	J. Kent Trinkle*	Richard B. McElvein
1983—Marco Island, FL	Francis Robicsek	Harvey W. Bender, Jr.
1984—Hilton Head, SC	Charles R. Hatcher, Jr.	Harvey W. Bender, Jr.
1985—Boca Raton, FL	George C. Kaiser	Harvey W. Bender, Jr.
1986—White Sulphur Springs, WV	Richard B. McElvein	Harvey W. Bender, Jr.
1987—Boca Raton, FL	J. Alex Haller, Jr.*	Gordon F. Murray*
1988—Marco Island, FL	O. Brewster Harrington*	Gordon F. Murray*
1989—Scottsdale, AZ	Richard E. Clark	Gordon F. Murray*
1990—Dorado, Puerto Rico	Harvey W. Bender, Jr.	Gordon F. Murray*
1991—Orlando, FL.	Robert M. Sade.	Hendrick B. Barner
1992—Wesley Chapel, FL	William A. Cook	Hendrick B. Barner
1993—Panama City Beach, FL	Gordon F. Murray*	Hendrick B. Barner
1994—Marco Island, FL	Ronald C. Elkins	Hendrick B. Barner
1995—San Antonio, TX	Frederick L. Grover	D. Glenn Pennington
1996—Cancun, Mexico	William C. Alford	D. Glenn Pennington
1997—Naples, FL	Kit. V. Arom*	D. Glenn Pennington
1998—Orlando, FL	Hendrick B. Barner	D. Glenn Pennington
1999—San Juan, PR	William A. Baumgartner	Carolyn E. Reed*
2000—Marco Island, FL	Donald C. Watson	Carolyn E. Reed*
2001—San Antonio, TX	William F. Sasser	Carolyn E. Reed*
2002—Miami, FL	Constantine Mavroudis	Carolyn E. Reed*
2003—Bonita Springs, FL	Joseph I. Miller, Jr.	John H. Calhoon
2004—Cancun, Mexico	D. Glenn Pennington	John H. Calhoon
2005—Orlando, FL	Irving L. Kron	John H. Calhoon
2006 –Tucson, AZ	Ross Ungerleider	John H. Calhoon
2007—Bonita Springs, FL	Carolyn E. Reed*	Robert J. Cerfolio
2008—Austin, TX	John W. Hammon	Robert J. Cerfolio
2009—Marco Island, FL	Michael J. Mack	Robert J. Cerfolio
2010—Orlando, FL	Keith S. Naunheim	Robert J. Cerfolio
2011—San Antonio, TX	Joseph S. Coselli	David R. Jones
2012—Naples, FL	Walter H. Merrill	David R. Jones
2013—Scottsdale, AZ	Robert J. Cerfolio	David R. Jones
2014—Tucson, AZ	Richard L. Prager	David R. Jones
2015—Orlando, FL	John H. Calhoon	Daniel L. Miller
2016—Naples, FL	Andrea J. Carpenter	Daniel L. Miller
2017—San Antonio, TX	David R. Jones	Daniel L. Miller

* Deceased

AWARDS

CLIFFORD VAN METER PRESIDENT'S AWARD

Formerly known as the President's Award, the Clifford Van Meter President's Award was established in 2008 to recognize the best scientific paper delivered at the STSA Annual Meeting. In 2013, this Award was augmented to specifically recognize the best adult cardiac surgery paper delivered at the Annual Meeting. The award is given on the basis of originality, content, and presentation. Previous award recipients have uniformly displayed excellence in all areas. The selected author receives a certificate identifying the award and a suitable monetary reward. The recipient is chosen by the President with assistance from the Council.

CLIFFORD VAN METER PRESIDENT'S AWARD RECIPIENTS

1964—Bertram A. Glass	New Orleans, Louisiana
1965—Harold C. Urschel, Jr.	Dallas, Texas
1966—Thomas J. Yeh	Savannah, Georgia
1967—Yale H. Zimberg	Richmond, Virginia
1968—J. Alex Haller, Jr.	Baltimore, Maryland
1969—William H. Sewell	Sayre, Pennsylvania
1970—George R. Daicoff	St. Petersburg, Florida
1971—Charles E. Eastridge	Memphis, Tennessee
1972—J. Kent Trinkle	San Antonio, Texas
1973—Donald L. Bricker	Lubbock, Texas
1974—Harvey W. Bender, Jr.	Nashville, Tennessee
1975—Charles E. Martin	Nashville, Tennessee
1976—Gordon F. Murray	Chapel Hill, North Carolina
1977—Denis H. Tyras	St. Louis, Missouri
1978—Joseph I. Miller, Jr.	Atlanta, Georgia
1979—M. Wayne Flye	Galveston, Texas
1980—Francis Robicsek	Charlotte, North Carolina
1981—Ellis L. Jones	Atlanta, Georgia
1982—William G. Malette	Omaha, Nebraska
1983—Robert H. Breyer	Springfield, Massachusetts
1984—Blair A. Keagy	Chapel Hill, North Carolina
1985—John W. Hammon, Jr.	Nashville, Tennessee
1986—William H. Frist	Nashville, Tennessee
1987—Jean-Nicolas Vauthey	New Orleans, Louisiana
1988—Robert A. Gustafson	Morgantown, West Virginia
1989—Harvey I. Pass	Bethesda, Maryland
1990—Vincent L. Gott	Baltimore, Maryland
1991—Ross M. Ungerleider	Durham, North Carolina
1992—William H. Frist	Nashville, Tennessee
1993—Kirk R. Kanter	Atlanta, Georgia
1994—Thomas L. Spray	St. Louis, Missouri
1995—Constantine Mavroudis	Chicago, Illinois
1996—David A. Fullerton	Denver, Colorado
1997—Christopher J. Knott-Craig	Oklahoma City, Oklahoma
1998—James L. Zellner	Charleston, South Carolina
1999—Thomas D'Amico	Durham, North Carolina
2000—Joseph C. Cleveland, Jr.	Denver, Colorado
2001—Neal D. Kon	Winston-Salem, North Carolina
2002—Joseph S. Coselli	Houston, Texas
2003—Robert J. Cerfolio	Birmingham, Alabama
2004—Malcolm DeCamp	Boston, Massachusetts
2005—Seenu V. Reddy	San Antonio, Texas
2006—Andrew W. ElBardissi	Rochester, Minnesota
2007—John Stulak	Rochester, Minnesota
2008—G. Chad Hughes	Durham, North Carolina
2009—Scott H. Johnson	Lansing, Michigan
2010—Kenneth A. Kesler	Indianapolis, Indiana
2011—Robert Stewart	Cleveland, Ohio
2012—Haritha Reddy	Ann Arbor, Michigan
2013—Bartosz Rylski	Freiburg, Germany
2014—Stephano Mastrobuoni	Brussels, Belgium
2015—Anthony L. Estrera	Houston, Texas
2016—A. Michael Borkon/Kaitlyn Carl	Kansas City, Missouri
2017—Anita Nguyen	Rochester, Minnesota

CAROLYN REED PRESIDENT'S AWARD

The Carolyn Reed President's Award was established in 2013 to recognize the best general thoracic surgery scientific paper delivered at the STSA Annual Meeting. Named in memory of STSA Past President, Carolyn E. Reed, MD, (STSA President, 2006-07), this award will be given on the basis of originality, content, and presentation. The selected author receives a certificate identifying the award and a suitable monetary reward. The recipient is chosen by the President with assistance from the Council.

2013—R. Douglas Adams	Merrillville, Indiana
2014—Pamela Samson	Webster Groves, Missouri
2015—Jonathan Spicer	Montreal, Quebec
2016—Thoralf Sundt	Boston, Massachusetts
2017—Linda W. Martin	Charlottesville, Virginia

GEORGE R. DAICOFF PRESIDENT'S AWARD

The George R. Daicoff President's Award was established in 2013 to recognize the best congenital heart surgery scientific paper delivered at the STSA Annual Meeting. Named for longtime active member, George R. Daicoff, MD, this award will be given on the basis of originality, content, and presentation. The selected author receives a certificate identifying the award and a suitable monetary reward. The recipient is chosen by the President with assistance from the Council.

2013—Vincent K.H. Tam	Fort Worth, Texas
2014—Jennifer Solms Nelson	Chapel Hill, North Carolina
2015—James D. St. Louis	Wayzata, Minnesota
2016—William Patrick	Menlo Park, California
2017—Minoo N. Kavarana	Charleston, South Carolina

TIKI AWARD

The quality of slides can greatly enhance or detract from a scientific presentation. In order to emphasize the importance of well-planned and prepared slides, the Southern Thoracic Surgical Association has created the Tiki Award. This award is given to the person who presents a slide at the annual meeting which is judged by a committee appointed by the President to be the most memorable and noteworthy. This slide can be selected because it is unintelligible, confusing, cluttered, irrelevant, or conversely because it is superbly clear, concise, colorful, pertinent, and/or utilizes state of the art graphics.

TIKI AWARD RECIPIENTS

1964—Watts R. Webb	New Orleans, Louisiana
1965—J. Alex Haller, Jr.	Baltimore, Maryland
1966—Richard M. Peters	San Diego, California
1967—Myron W. Wheat	St. Petersburg, Florida
1968—Carl H. Almond	Columbia, South Carolina
1969—Francis Robicsek	Charlotte, North Carolina
1970—William A. Neely	Jackson, Mississippi
1971—Paul C. Adkins	Washington, DC
1972—Panagiotis Symbas	Atlanta, Georgia
1973—James L. Alexander	Savannah, Georgia
1974—Lloyd H. Hudson	Flint, Michigan
1975—Richard E. Clark	St. Louis, Missouri
1976—William S. Lyons	Alexandria, Virginia
1977—Maruf A. Razzuk	Dallas, Texas
1978—Harold C. Urschel, Jr.	Dallas, Texas
1979—Maruf A. Razzuk	Dallas, Texas
1980—Francis Robicsek	Charlotte, North Carolina
1981—Robert Sade	Charleston, South Carolina

AWARDS

1982—Kit V. Arom	Minneapolis, Minnesota
1983—Herbert E. Warden	Morgantown, West Virginia
1984—Noel L. Mills	New Orleans, Louisiana
1985—George C. Kaiser	St. Louis, Missouri
1986—J. G. Selle	Charlotte, North Carolina
1987—Steven Gundry	Baltimore, Maryland
1988—Harvey I. Pass	Bethesda, Maryland
1989—Duke E. Cameron	Baltimore, Maryland
1990—Richard E. Clark	Pittsburgh, Pennsylvania
1991—William H. Coltharp	Nashville, Tennessee
1992—Joseph S. Coselli	Houston, Texas
1993—Benson R. Wilcox	Chapel Hill, North Carolina
1994—P. Michael McFadden	New Orleans, Louisiana
1995—Carolyn E. Reed	Charleston, South Carolina
1996—John L. Ochsner	New Orleans, Louisiana
1997—Clifford H. Van Meter, Jr.	New Orleans, Louisiana
1998—John D. Oswalt	Austin, Texas
1999—W. Randolph Chitwood	Greenville, North Carolina
2000—Ross M. Ungerleider	Portland, Oregon
2001—Neal D. Kon	Winston-Salem, North Carolina
2002—W. Steves Ring	Dallas, Texas
2003—Betsey Urschel	Dallas, Texas
2004—John Puskas	Atlanta, Georgia
2005—Meredith Scott	Shell, Wyoming
2006—Constantine Mavroudis	Chicago, Illinois
2007—Robert J. Cerfolio	Birmingham, Alabama
2008—Curt Tribble	Gainesville, Florida
2009—Jeffrey P. Jacobs	St. Petersburg, Florida
2010—Peter K. Smith	Durham, North Carolina
2011—John Calhoon	Houston, Texas
2012—Vinay Badhwar	Pittsburgh, Pennsylvania
2013—Lorraine Cerfolio	Birmingham, Alabama
2014—Kristine J. Guleserian	Dallas, Texas
2015—Daniel L. Miller	Marietta, Georgia
2016—Thoralf M. Sundt	Boston, Massachusetts
2017—Joseph A. Dearani	Rochester, Minnesota

OSLER ABBOTT AWARD

The Osler Abbott Award was first given in 1960 and has been awarded annually to that member of the Association who excels in the art of discussionmanship. It was named for Osler Abbott, MD of Atlanta, Georgia, who, in 1950, somehow managed to discuss 26 papers, no mean feat since only 25 were presented and one was his own!

In the early years, sheer volume of discussion was sufficient to earn at least an honorable mention, but volume alone never won the award. More important were factors such as pomposity, arrogance, irrelevancy, and the use of outdated slides which had been shown on two or more occasions. In recent years, the tactics have ranged from extreme subtlety to blatant exhibitionism and from apparent indifference to obvious covetousness.

To place this traditional award on a somewhat higher plane of competition, the Council, in its wisdom, decided to base the decision on Oslerian principles, and selection would come from evaluation of the more memorable of discussions during the scientific sessions.

Thus, the reincarnated purposes of the Osler Abbott Award of the Southern Thoracic Surgical Association are:

1. To focus on the importance of open, frank, and candid discussion in the spirit and substance of the Southern Thoracic Surgical Association and, in this way, to encourage more objective and active participation by all members attending the Annual Meeting.
2. To stimulate a healthy give-and-take among the members and, thereby, enhance the camaraderie and esprit-de-corps which have traditionally characterized the Southern Thoracic Surgical Association.

OSLER ABBOTT AWARD RECIPIENTS

1960—Joseph W. Peabody, Jr.	Washington, DC
1961—Milton V. Davis	Dallas, Texas
1962—E. Converse Peirce, II	New York, New York
1963—Lewis H. Bosher, Jr.	Richmond, Virginia
1964—Sam E. Stephenson, Jr.	Jacksonville, Florida
1965—Bertram A. Glass	New Orleans, Louisiana
1966—Robert E. Carr	Fort Worth, Texas
1967—Osler A. Abbott	Atlanta, Georgia
1968—Watts R. Webb	New Orleans, Louisiana
1969—William A. Cook	Andover, Massachusetts
1970—Edward F. Parker	Charleston, South Carolina
1971—Minas Joannides, Jr.	St. Petersburg, Florida
1972—J. Alex Haller, Jr.	Baltimore, Maryland
1973—Harold C. Urschel, Jr.	Dallas, Texas
1974—Bertram A. Glass	New Orleans, Louisiana
1975—Gilbert S. Campbell	Little Rock, Arkansas
1976—James W. Brooks	Richmond, Virginia
1977—J. Kent Trinkle	San Antonio, Texas
1978—Raymond C. Read	Little Rock, Arkansas
1979—Richard E. Clark	St. Louis, Missouri
1980—Joseph Peabody, Jr.	Washington, DC
1981—Robert M. Sade	Charleston, South Carolina
1982—James S. Donahoo	Philadelphia, Pennsylvania
1983—Francis Robicsek	Charlotte, North Carolina
1984—Milton V. Davis	Kaufman, Texas
1985—George C. Kaiser	St. Louis, Missouri
1986—Milton V. Davis	Kaufman, Texas
1987—J. Alex Haller, Jr.	Baltimore, Maryland
1988—Ronald C. Elkins	Oklahoma City, Oklahoma
1989—Bradley M. Rodgers	Charlottesville, Virginia
1990—Harvey W. Bender, Jr.	Nashville, Tennessee
1991—Kamal A. Mansour	Atlanta, Georgia
1992—Arthur E. Baue	St. Louis, Missouri
1993—Kit V. Arom	Minneapolis, Minnesota
1994—Frederick L. Grover	Denver, Colorado
1995—Constantine Mavroudis	Chicago, Illinois
1996—George Daicoff	St. Petersburg, Florida
1997—Ross M. Ungerleider	Durham, North Carolina
1998—Lynn Harrison	New Orleans, Louisiana
1999—William A. Baumgartner	Baltimore, Maryland
2000—Robert J. Cerfolio	Birmingham, Alabama
2001—Carolyn E. Reed	Charleston, South Carolina
2002—John H. Calhoon	San Antonio, Texas
2003—Constantine Mavroudis	Chicago, Illinois
2004—Keith S. Naunheim	St. Louis, Missouri
2005—Irving L. Kron	Charlottesville, Virginia
2006—Thoralf M. Sundt	Rochester, Minnesota
2007—W. Steves Ring	Dallas, Texas
2008—John W. Hammon	Winston-Salem, North Carolina
2009—Kevin D. Accola	Orlando, Florida
2010—Vinod H. Thourani	Atlanta, Georgia
2011—Jeffrey P. Jacobs	St. Petersburg, Florida
2012—Duke E. Cameron	Baltimore, Maryland
2013—Daniel L. Miller	Marietta, Georgia
2014—Stephen C. Yang	Baltimore, Maryland
2015—Joseph A. Dearani	Rochester, Minnesota
2016—Douglas J. Mathisen	Boston, Massachusetts
2017—Daniela Molena	New York, New York

AWARDS

KENT TRINKLE EDUCATION LECTURESHIP

The Kent Trinkle Educational Lectureship is dedicated to J. Kent Trinkle, (STSA President, 1981-82) for his contributions to cardiothoracic surgery and STSA. Each year, in honor of Dr. Trinkle's remarkable dedication to student education, an STSA member is selected to present on his/her training program. Presenters are selected by the STSA President.

1993—Benson R. Wilcox	Chapel Hill, North Carolina
1994—George C. Kaiser	St. Louis, Missouri
1995—J. Kent Trinkle	San Antonio, Texas
1996—Irving L. Kron	Charlottesville, Virginia
1997—William A. Baumgartner	Baltimore, Maryland
1998—Donald C. Watson, Jr.	Memphis, Tennessee
1999—Fred A. Crawford, Jr.	Charleston, South Carolina
2000—Robert A. Guyton	Atlanta, Georgia
2001—Joel D. Cooper	St. Louis, Missouri
2002—W. Steves Ring	Dallas, Texas
2003—Walter G. Wolfe	Durham, North Carolina
2004—Joseph Coselli	Houston, Texas
2005—Neal Kon	Winston-Salem, North Carolina
2006—Joe B. Putnam, Jr.	Nashville, Tennessee
2007—Walter H. Merrill	Cincinnati, Ohio
2008—Curt Tribble	Gainesville, Florida
2009—Irving L. Kron	Charlottesville, Virginia
2010—Michael R. Mill	Chapel Hill, North Carolina
2011—John H. Calhoon	Houston, Texas
2012—Bartley P. Griffith	Baltimore, Maryland
2013—Michael Argenziano	New York, New York
2014—Mark S. Slaughter	Louisville, Kentucky
2015—John S. Ikonomidis	Charleston, South Carolina
2016—William A. Baumgartner	Baltimore, Maryland
2017—Marc R. Moon	St. Louis, Missouri

HAROLD URSCHEL HISTORY LECTURESHIP

The Harold Urschel History Lectureship is dedicated to long-time STSA member and contributor, Harold C. Urschel, Jr., MD, (STSA Historian, 2001-12). This lectureship was established in memory of Dr. Urschel in 2013. The lecturer will be selected annually by the Program Committee as the abstract author who submitted the most exemplary history abstract.

2013—Joseph S. Coselli	Houston, Texas
2014—Daniel L. Miller	Marietta, Georgia
2015—Erle H. Austin	Louisville, Kentucky
2016—Robert M. Sade	Charleston, South Carolina
2017—Stephen C. Yang	Baltimore, Maryland

HAWLEY H. SEILER RESIDENTS COMPETITION AWARD

The Hawley H. Seiler Residents Competition Award is presented for an outstanding paper by a cardiothoracic or general surgery resident. It is bestowed upon the resident excelling in the following categories regarding their abstract submission: quality of abstract as well as manuscript and oral presentation. The award is named after STSA Past President and founding member, Hawley H. Seiler.

Dr. Seiler's many contributions to STSA included serving as Secretary for 15 years and presenting on numerous topics at Annual Meetings.

1997—Elaine E. Tseng	Baltimore, Maryland
1998—Stephen Langley	Durham, North Carolina
1999—Aron Goldberg	Charleston, South Carolina

2000—Cullen D. Morris	Atlanta, Georgia
2001—Sitaram M. Emani	Durham, North Carolina
2002—Thomas H. Maxey	Charlottesville, Virginia
2003—Brian T. Bethea	Baltimore, Maryland
2004—Tara Karamlou	Portland, Oregon
2005—Edward John Hickey	London, England
2006—Thomas K. Varghese	Seattle, Washington
2007—Tara Karamlou	Portland, Oregon
2008—David T. Cooke	Sacramento, California
2009—Jeremiah Geoff Allen	Baltimore, Maryland
2010—Castigliano M. Bhamidipati	Charlottesville, Virginia
2011—Sameh Said	Rochester, Minnesota
2012—Timothy George	Baltimore, Maryland
2013—Rachel L. Medbery	Atlanta, Georgia
2014—Damian J. LaPar	Charlottesville, Virginia
2015—Emily A. Downs	Charlottesville, Virginia
2016—J. Trent Magruder	Baltimore, Maryland
2017—Joshua M. Rosenblum	Atlanta, Georgia

MAVROUDIS-URSCHEL AWARD

The Mavroudis-Urschel Award was established in 2006 to recognize and honor an STSA member who has not only made important contributions to the STSA scientific program, but who has also uniquely personified the social spirit, camaraderie, and fun for which STSA is famous. The award is named for STSA Past Presidents Constantine Mavroudis and Harold Urschel, who both contributed significantly not only to the scientific value of the STSA Annual Meeting but also, and just as importantly, to the organization's high spirits (and high-jinx).

There is more to an organization than its bylaws, and there is more to its Annual Meeting than the slides and presentations. To many, STSA meetings are as much about social interactions as they are about new research findings in cardiothoracic surgery. Meeting highlights also happen at social events, such as the president's mixer, receptions, sports events, and during the exhibit hall breaks. The Award goes to a member who has enhanced both aspects of the organization, scientific and social, and done so with a distinctive, even flamboyant, personal style – in the manner of its namesakes.

The Mavroudis-Urschel Award is made at the discretion of the President with input and recommendation from the double-secret Tiki and Osler-Abbot committee chairs. When given, the award is announced at the annual dinner gala.

2007—Kit V. Arom	Bangkok, Thailand
2009—John H. Calhoon	San Antonio, Texas
2010—Keith S. Naunheim	St. Louis, Missouri
2011—Francis Robicsek	Charlotte, North Carolina
2012—Harold C. Urschel, Jr.*	Dallas, Texas
2013—Kevin D. Accola	Orlando, Florida
2014—Andrea J. Carpenter	San Antonio, Texas
2015—Kamal A. Mansour*	Atlanta, GA
2016—Shanda H. Blackmon	Rochester, Minnesota
2017—Stephen C. Yang	Baltimore, Maryland

*Deceased

AWARDS

STSA INSPIRATION AWARD

The STSA Inspiration Award was established in 2007 to recognize the important contribution of mentorship to the specialty and the organization, and to encourage upcoming generations of CT surgeons by helping to cultivate mentors worthy of emulation.

The future of cardiothoracic surgery is in the hands and hearts of its medical students and residents. Inspiring a resident or medical student to become a CT surgeon – to become a great CT surgeon – is among the most far-reaching and important contributions one can make to the specialty and ultimately to the Southern Thoracic Surgical Association.

The residency program directors and faculty at teaching programs affiliated with the STSA are developing and inspiring future cardiothoracic surgeons every day -- teaching them to become leaders in their future institutions, practices, and communities. And mentorship is not limited to program directors and faculty. Surgeons in private practice hire young graduates and become influential mentors providing career guidance and support often for years to come.

To acknowledge the crucial importance of mentorship in developing CT surgeons and to recognize and positively reinforce STSA members who have excelled in their mentorship roles, STSA established its Inspiration Award in 2007. The Inspiration Award is given to the STSA member who has demonstrated exceptional efforts in motivating, inspiring, and cultivating the clinical and research talents of medical students, residents and/or early career CT surgeons.

Nominations must be submitted in writing by September 1 to the sitting STSA President to be considered for possible presentation at the subsequent STSA Annual Meeting. Recommendation letters should outline the specific merits of the nominee and his or her positive influences for the 'mentee(s).' Recipient must be a member of STSA in good standing. The award is given at the discretion of the President in consultation with the Council.

2007—	Robert J. Cerfolio	Birmingham, Alabama
	Hooshang Bolooki	Miami, Florida
2009—	Irving L. Kron	Charlottesville, Virginia
2010—	Kamal A. Mansour	Atlanta, Georgia
	Francis Robicsek	Charlotte, North Carolina
2012—	Harvey W. Bender, Jr.	Nashville, Tennessee
	Frederick L. Grover	Aurora, Colorado
	Ara A. Vaporciyan	Houston, Texas
2013—	James Robert Headrick	Chattanooga, Tennessee
2014—	Curtis G. Tribble	Charlottesville, Virginia
2015—	L. Henry Edmunds	Bryn Mawr, Pennsylvania
2016—	Clinton E. Baisden	San Antonio, Texas
2017—	Jennifer S. Lawton	Baltimore, Maryland
	Richard Lee	St. Louis, Missouri

JAMES W. BROOKS MEDICAL STUDENT SCHOLARSHIP

The STSA James W. Brooks Medical Student Scholarship was established in 2010 to pay tribute to Dr. Jim Brooks, past president of STSA and a great mentor to countless residents and students. The Brooks Scholarship seeks to identify 2nd, 3rd, and 4th year medical students in the STSA region who are interested in cardiothoracic surgery. The recipient(s), selected annually by a committee of STSA leaders, receives funding to attend the STSA Annual Meeting and the unique opportunity to benefit from the guidance of STSA members, thus extending Dr. Brooks' legacy as a great mentor. It has become increasingly important to begin mentoring future CT surgeons at the medical student level. In establishing the Brooks Scholarship and providing first-rate mentorship, STSA hopes to annually inspire promising medical students to become great CT surgeons, thus making a far-reaching and important contribution to the future of the specialty and ultimately to the STSA.

2010—	Elizabeth A. Spradlin	Richmond, Virginia
2011—	Carlo Bartoli	Louisville, Kentucky
2012—	Vernissia Tam	Baltimore, Maryland
2013—	Sahar Saddoughi	Charleston, South Carolina
2014—	Mickey Ising	Louisville, Kentucky
	Xiaoying Lou	Chicago, Illinois
2015—	Bogdan Kindzelski	Potomac, MD
	Graham Ungerleider	Winston-Salem, North Carolina
2016—	Caitlin Brown	Portland, Oregon
	Andrew Percy	Richmond, Virginia
2017—	Trevor Davis	Baltimore, Maryland
	John Kelly	Atlanta, Georgia
	Raymond Strobel	Ann Arbor, Michigan

STSA JAMES W. BROOKS RESIDENT SCHOLARSHIP

The STSA James W. Brooks Resident Scholarship was established in 2014 and seeks to identify a general surgery resident who is committed to CT surgery. Each year a scholarship recipient will be invited to attend the STSA Annual Meeting where they will be mentored by an STSA surgeon leader.

2014—	Zachary Kon	Baltimore, MD
2015—	Erin Schumer	Louisville, Kentucky
	Mansi Shah	Chapel Hill, North Carolina
2016—	Sameer Hirji	Alston, Massachusetts
	David Ranney	Durham, North Carolina
2017—	Charles Fraser	Baltimore, Maryland

EXHIBITORS*

*Confirmed as of October 11, 2018

EXHIBIT HOURS AND FLOOR PLAN

EXHIBIT HOURS

THURSDAY, NOVEMBER 8

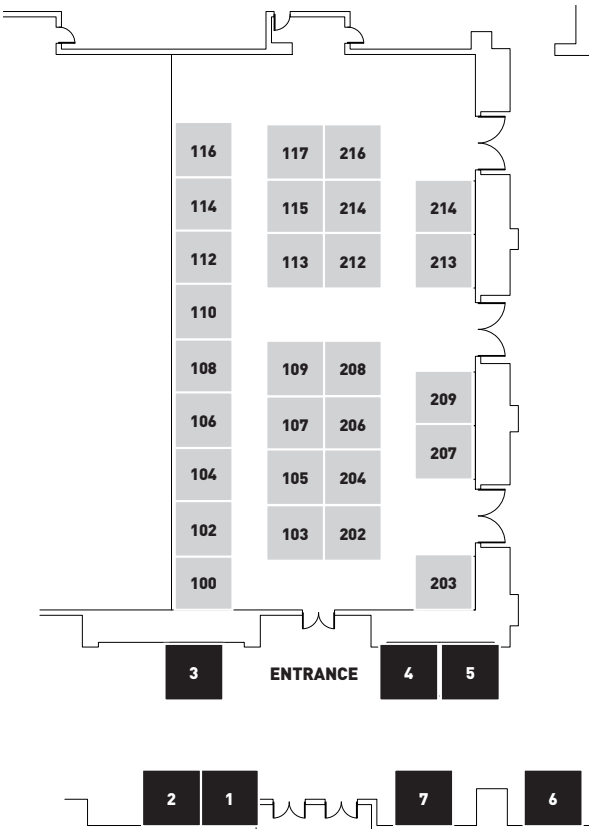
Exhibits Open	10:00 am – 12:00 pm 1:30 pm – 3:30 pm

FRIDAY, NOVEMBER 9

Exhibits Open	7:45 am – 12:00 pm 12:45 pm - 3:30 pm

The exhibit hall will be closed during the lunch hour. On Thursday, the exhibit hall will close from 12:00-1:30 pm and on Friday, from 12:00-12:45 pm. Exhibit hours will resume after lunch each day.

- **Exhibit Hall is located in the Magnolia Ballroom A-C**
- **All coffee breaks scheduled during show hours are in the exhibit area**
- **Complimentary coffee and pastries will be served**



EXHIBITORS

ABBOTT **BOOTH: 110**

Alpharetta, GA 30022

Abbott Structural Heart is a leader in Cardiovascular Devices. Our products include Trifecta Aortic Valves, Epic Mitral Valves, Regent Aortic Mechanical Valves, Mitraclip, and Amplatzer closure devices.

ADMEDUS **BOOTH: 107**

Eagan, MN 55121

ADMEDUS, is a global healthcare company, dedicated to working with leading surgeons around the world, to deliver clinically superior medical technologies that make a difference in patients' lives. CardioCel®, CardioCel Neo® and VascuCel ® are biomaterial scaffolds, engineered with ADAPT® Technology, for cardiac and vascular surgical procedures. ADAPT processed biomaterials offer unparalleled biocompatibility and calcium resistance. Admedus' uniquely shaped collagen product, CardioCel 3D, also made with ADAPT Technology, is intended to optimize complex pediatric arch reconstruction.

ASBESTOS.COM **BOOTH: 208**

Orlando, FL 32801

Since its inception in 2006, Asbestos.com has served as an advocacy center, providing hope and delivering quality mesothelioma resources through our Medical Outreach Department to patients and HCP's.

ATRICURE, INC. **BOOTH: 207**

West Chester, OH 45069

AtriCure provides solutions designed to decrease the Afib epidemic. AtriCure's Synergy™ Ablation System is approved for the treatment of persistent and longstanding persistent Afib in patients undergoing certain concomitant procedures.

AZIYO BIOLOGICS **BOOTH 212**

Silver Spring, MD 20904

ProxiCorTM for Pericardial Closure and Cardiac Tissue Repair is an extracellular matrix (ECM) used in various cardiac and vascular surgery applications. It remodels over time into healthy, vascularized tissue.

BIOM'UP USA, INC. **BOOTH: 5**

New York, NY 10011

Biom'up is a fast-grown biomedical company, specialized in collagen-based absorbable medical devices for biosurgery. In December 2017, the company obtained PMA approval from the FDA for HEMOBLAST™Bellows, its flagship product.

BIOSTABLE SCIENCE & ENGINEERING **BOOTH: 113**

Austin, TX 78754

BioStable Science & Engineering is developing and commercializing proprietary valve repair technologies that provide an alternative to valve replacement for aortic valve disease. The company's HAART Aortic Annuloplasty Devices are designed to simplify and standardize aortic valve repair for patients undergoing surgery for aortic insufficiency or root aneurysm.

CONMED **BOOTH: 203**

Utica, NY 13502

CONMED develops, manufactures, and markets leading technologies for minimally invasive surgery including the AirSeal System, the first and only insufflation system specifically cleared by the FDA for thoracic surgery, and the Anchor Specimen Retrieval System, the first and only tissue extraction device cleared by the FDA for redeployment.

CRYOLIFE **BOOTH: 104**

Kennesaw, GA 30144

Headquartered in Suburban Atlanta, Georgia, CryoLife is a leader in the manufacturing, processing, and distribution of medical devices and implantable tissues used in cardiac and vascular surgical procedures focused on aortic repair. CryoLife markets and sells products in more than 90 countries worldwide. For additional information about Cryolife, visit our website, www.cryolife.com.

EDWARDS LIFESCIENCES **BOOTH: 3**

Irvine, CA 92614

Edwards Lifesciences, based in Irvine, California, is the global leader in patient-focused medical innovations for structural heart disease, as well as critical care and surgical monitoring. For more information, visit www.Edwards.com and follow us on Twitter @EdwardsLifesci.

ETHICON US, LLC **BOOTH: 204**

Somerville, NJ 08876

Ethicon US LLC , a Johnson & Johnson company, commercializes a broad range of innovative surgical products, solutions and technologies. Learn more at www.ethicon.com, or follow us on Twitter @Ethicon.

FEHLING SURGICAL INSTRUMENTS **BOOTH: 202**

Acworth, GA 30101

Fehling Surgical Instruments is the leader in fine crafted surgical instrumentation that has focused on Cardio Thoracic surgery for over 30 years. Our products also include a full MICS offering.

EXHIBITORS

KARL STORZ ENDOSCOPY-AMERICA INC. **BOOTH: 102**

El Segundo, CA 90245

KARL STORZ offers solutions for video-assisted thoracoscopic surgery, including Video Mediastinoscopes that facilitate video recording. And, our ENDOCAMELEON® Laparoscopes allow the viewing direction to be adjusted from 0° to 120°.

KLS-MARTIN **BOOTH: 209**

Jacksonville, FL 32245

KLS Martin is a company dedicated to producing innovative medical devices for craniomaxillofacial surgery including surgical instruments, distraction osteogenesis devices, and power systems.

LIFENET HEALTH **BOOTH: 109**

Virginia Beach, VA 23453

LifeNet Health is a leader in global regenerative medicine. It provides organ, tissue and cell-based solutions for clinicians and researchers. Saving Lives, Restoring Health, Giving Hope. Learn more at lifenethealth.org.

MED ALLIANCE SOLUTIONS **BOOTH: 213**

Sycamore, IL 60178

MED Alliance Solutions empowers your approach to cardio-thoracic surgery. We offer innovative, high-quality and cost-effective cardio-thoracic medical devices on a national basis.

MEDTRONIC **BOOTH: 103-105**

Minneapolis, MN 55432

As a global leader in medical technology, we improve the lives and health of millions of people each year— with our innovative therapies, services, and solutions. Learn how we're taking healthcare Further, Together at Medtronic.com.

MIMEDX® **BOOTH: 215**

Marietta, GA 30062

MiMedx® is a leading biopharmaceutical company developing and marketing regenerative and therapeutic biologics utilizing human placental tissue allografts with patent-protected processes for multiple sectors of healthcare. MiMedx® has distributed over 1,300,000 amniotic tissue grafts worldwide and achieved profound clinical outcomes in multiple therapeutic areas including ophthalmology, spine, chronic wounds, dental, orthopedic surgery, spine, sports medicine, urology, colorectal, and most recently Thoracic and Cardiothoracic. With over 40 scientific and clinical publications including multiple Randomized Controlled Trial (RCTs) published, MiMedx® is dedicated to research in these specialties.

We intend to remain at the forefront of innovation in regenerative medicine and biopharmaceuticals. "Innovations in Regenerative Medicine" is the framework behind our mission to provide physicians with products and tissues to help the body heal itself.

QUEST MEDICAL **BOOTH: 7**

Allen, TX 75002

Medical device manufacturer of the MPS 2, aortic punches, safety valves, and vascular loops. The MPS 2 Myocardial Protection System helps surgeons and perfusionists effectively deliver any intermittent or single dose cardio-protective protocol to the heart.

SCANLAN INTERNATIONAL, INC. **BOOTH: 4**

St. Paul, MN 55107

Highest quality surgical products designed and manufactured by the Scanlan family since 1921. 3,000 stainless steel & titanium precision instruments, VATS Dennis Rib Cutter & Rocco Nodule Clamps, Single-Use Products.

TERUMO **BOOTH 216**

At Terumo Cardiovascular Group, we develop, manufacture, and distribute medical devices for cardiac and vascular surgery with an emphasis on cardiopulmonary bypass, intra-operative monitoring and vascular grafting.

TRANSONIC SYSTEMS **BOOTH 112**

Transonic, the pioneer in CABG flow assessment, offers state-of-the-art technology for on-the-spot quantitative confirmation of bypass flow to guarantee early graft patency.

VERAN MEDICAL **BOOTH: 100**

St. Louis, MO 63114

Veran is a privately held medical device company headquartered in St. Louis, MO. The Company's main focus is assisting physicians in the early diagnosis and treatment of lung cancer.

VITALCOR, INC. **BOOTH: 108**

Westmont, IL 60559

Coronary Artery Perfusion Cannula Balloon. LED light source (20,000+ hours) & Gemini Plus headlight with camera. Axiom Wound Drains with specialized Clot Stop. Titanium and stainless steel specialty instruments & retractors.

ZIMMER BIOMET **BOOTH: 1**

Jacksonville, FL 32218

Founded in 1927 and headquartered in Warsaw, Indiana, Zimmer Biomet is a global leader in musculoskeletal healthcare. We design, manufacture and market a comprehensive portfolio of innovative Thoracic products and treatment solutions for surgeons and patients including, the RibFix Blu Thoracic Fixation System and the SternaLock Blu Primary Closure System.

NECROLOGY REPORT

Theodore D. Aylward, MD
New Port Richey, FL

Robert P. Barnes, MD
Boise, ID

R. Daley Goff, Jr., MD
Winchester, VA

J. Alex Haller, MD
Glencoe, MD

Edward W. Jenkins, MD
Tulsa, OK

Gordon F. Murray, MD
Southport, NC

Ahmad Rahbar, MD
Wheeling, WV

CONSTITUTION AND BYLAWS

SOUTHERN THORACIC SURGICAL ASSOCIATION CONSTITUTION AND BYLAWS

(as amended November 10, 2017)

CONSTITUTION

ARTICLE I: NAME

The name of the Corporation shall be the SOUTHERN THORACIC SURGICAL ASSOCIATION, INC. (hereinafter designated as "the Association").

ARTICLE II: OBJECTIVES

The Association is a not-for-profit corporation whose principle objectives are to disseminate knowledge and information and to stimulate progress in the field of thoracic and cardiovascular surgery in the designated geographic area. The mission of the organization is to: support southern and southern trained members of the cardiothoracic surgery community and their families in the pursuit of the highest quality patient care, education, scientific achievement, collegiality, and life balance.

The Association will:

1. Disseminate knowledge, encourage research and report at the annual meeting, scientific session and postgraduate course on the advancements within the field of thoracic and cardiovascular surgery.

2. Promote fellowship among thoracic and cardiovascular surgeons throughout the designated geographic area.

3. Assure that the activities of the Association are undertaken without any discrimination with regard to race, color, religious creed, national origin, ancestry, physical handicap, medical condition, marital status or sex.

ARTICLE III: OFFICES

The Association shall have and continuously maintain a registered office and a registered agent in the State of Illinois, and may have such other offices in or outside the State of Illinois at the Council's discretion.

ARTICLE IV: MEMBERS

SECTION 1. Membership. There shall be six (6) categories of members: Active, Senior, Candidate, Pre-Candidate, Associate, and Honorary Member. Members shall be individuals who support the purpose of the Association and who agree to comply with the Association's rules and regulations. Active and Senior members shall be entitled to hold office and shall have voting privileges. Active and Senior Members must be board certified by the American Board of Thoracic Surgery (ABTS) or its foreign equivalent. If an Active Member moves from the designated membership geographical area outlined in SECTION 2, he or she may retain membership as long as all other requirements for membership are satisfied. Members whose practices have been limited because of disability, or who have reached the age of 65 years, may apply for Senior Membership. The Association shall not be required to subscribe to The Annals of Thoracic Surgery for Senior members. Associate Members include support staff for practicing cardiothoracic surgeons including, but not limited to, nurses, nurse practitioners, perfusionists, physician assistants, and research staff. Honorary membership can be bestowed upon a worthy recipient upon recommendation of the Council and ratification by a two-thirds majority of the votes at the annual meeting. Honorary Members are broadly defined as physicians who have made significant contributions to the field

of cardiothoracic surgery Nomination for Honorary Membership can be made to the Council in writing for review prior to the spring Council Meeting. Honorary Members are welcomed at all scientific and business meetings of the Association, but have no obligations or responsibilities in the organization. Candidate Members must be matched or enrolled in a thoracic surgery educational program accredited by the Residency Review Committee for Thoracic Surgery under the authority of the Accreditation Council for Graduate Medical Education that is within the STSA region provided for in SECTION 2 to be classified as a Candidate Member. Candidate Members may retain membership up to three years following the completion of their thoracic surgery training. Candidate members who have been certified in thoracic surgery by the ABTS may, upon written request to the Association and with a letter of recommendation from an Active Member of STSA and approval of the Membership Committee and the Council, transition directly, with no initiation fee applied, to Active Membership. If no such official request is forthcoming, Candidate Membership will be terminated and reinstatement will be dependent upon a formal application for Active Membership, with its associated requirements, including initiation fee and approval by the full membership. Pre-Candidate Members may apply for membership by expressing a desire to enter the field of cardiothoracic surgery. Pre-Candidate Members may transfer to Candidate Member status once they have matched or enrolled in a thoracic surgery educational program accredited by the Residency Review Committee for Thoracic Surgery under the authority of the Accreditation Council for Graduate Medical Education that is within the STSA region.

SECTION 2. Applicants. An applicant for Active Membership must at the time of acceptance reside, or have previously practiced cardiothoracic surgery for at least one year, or have completed a thoracic or general surgery residency program, or have completed a thoracic or cardiovascular research or clinical fellowship for at least twelve consecutive months in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean. An applicant for active membership must be certified by the ABTS. Applicants who meet the practice requirement above but whose training has been in countries other than the United States of America, and who are certified as proficient in thoracic and cardiovascular surgery by appropriate authorities in their home country, may apply. At least seventy-five percent of the practice of the applicant must be devoted to the field of thoracic and cardiovascular surgery, which may include research and peripheral vascular surgery. If an applicant is unsuccessful in obtaining membership in two successive years, an interval of two years must elapse before he/she may reapply. The Membership Committee and the Council may recommend acceptance of foreign training and certification by stating that, in their opinion, it represents equivalent status. The Membership Committee and Council may recommend acceptance of individuals who, despite not meeting membership criteria regarding training, practice or research in the STSA region, have demonstrated significant involvement with the organization through their participation in the annual meeting, contributions to the scientific program, and service to the organization. Applicants so approved by the Membership Committee and the Council may become Active Members upon election by the membership at an annual meeting.

An applicant for Candidate Membership must at the time of acceptance be matched or enrolled in a thoracic surgery educational program accredited by the Residency Review Committee for Thoracic Surgery under the authority of the Accreditation Council for Graduate Medical Education in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean. Individuals who have completed their education in one of the above programs and are in the process of acquiring certification in thoracic surgery by the ABTS are eligible to apply for Candidate Membership.

An applicant for Associate Membership must at the time of acceptance be working in field of allied health related to the practice of cardiothoracic surgery in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean.

An applicant for Pre-Candidate Membership must at the time of acceptance be enrolled in medical school or general surgery residency in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean. They must submit a written statement of interest in cardiothoracic surgery.

Active Membership status will not become effective, nor a certificate of membership presented, unless and until such elected applicant registers at one of the next four annual meetings following his/her initial election to membership. Resident and Associate Membership status will not become effective, nor a certificate of membership presented, unless and until such elected applicant registers for and attends an annual meeting following his or her election to membership. Exception for this requirement may be granted by a majority vote of the Council. Failure to comply with this procedure will require reapplication for membership.

SECTION 3. Applications. Application forms for Active, Associate, Candidate and Pre-Candidate Membership are available from the Secretary/Treasurer or at www.stsa.org and are forwarded to the Chair of the Membership Committee for verification. Applications will be verified by the Membership Committee in accordance with the policies and procedures established by the Council.

SECTION 4. Certificates. The Council shall issue a Certificate of the Association evidencing the member's admission to the Association and indicating membership status. These certificates remain the sole property of the Association and shall be surrendered upon written demand and/or for non-payment of dues.

SECTION 5. Resignation. Members may resign from the Association at any time by giving written notice to the Secretary/Treasurer of the Association. Such resignation shall not relieve the member of any obligation for dues, assessments or other charges previously accrued and unpaid. Membership is not transferable or assignable.

SECTION 6. Termination of Membership. The Council, by affirmative vote of two-thirds of all Council members present and voting at any duly constituted meeting of the Council, may suspend or expel a member for cause after an appropriate hearing in accordance with policies and procedures established by the Council. The Council, by affirmative vote of a majority of all Council members present and voting at any duly constituted meeting of the Council may terminate the membership of any member who has become ineligible for membership in accordance with the policies and procedures established by the Council.

SECTION 7. Application for Reinstatement. Any former members of the Association may apply for reinstatement through the regular application procedure.

ARTICLE V: DUES AND ASSESSMENTS

The initiation and annual dues for each category of member of the Association, the time for paying such dues, and other assessments, if any, shall be determined by the Council. Annual dues are not refundable.

ARTICLE VI: MEETING OF MEMBERS

SECTION 1. Annual Meeting. The annual meeting of the members shall be held at a date, time and place determined by the Council and shall be held in conjunction with the scientific session of the Association.

SECTION 2. Purpose. The purpose of the annual meeting is to: elect officers and councilors; receive reports from the Association on the activities of the Council; provide members an opportunity to express their opinions on matters affecting the Association; and to dispense with such other business, as necessary. The order of business for a meeting shall be determined in advance by the President and subsequently adopted at a called meeting.

SECTION 3. Special Meetings. Special meetings of the membership may be called by the President or the Council. Such special meetings shall be held at a date, time and place as determined by the Council.

SECTION 4. Notice of Meetings. Written notice stating the date, time and place of any annual or special meeting shall be delivered no less than seven (7) days, nor more than 30 days, before the date of the meeting to each member entitled to vote at the meeting. In the case of removal of one or more Council members, a merger, consolidation, dissolution or sale of assets, a written notice of no less than twenty (20) days or more than sixty (60) days before the date of the meeting will be given by, or at the direction of, the President, the Secretary, or the Council.

SECTION 5. Quorum. The quorum for the transaction of business at a meeting of members or special meeting shall be a majority of the members attending that meeting.

SECTION 6. Voting. Each member with voting rights shall be entitled to only one (1) vote. A majority of the votes present at a meeting where a quorum is present shall be necessary for the adoption of any matter voted upon by the members, except where otherwise provided by law, the articles of incorporation of the Association or these bylaws.

SECTION 7. Informal Action. Required action may be taken without a meeting if a consent in writing, setting forth the action taken, is signed by not less than the minimum number of members necessary to authorize such action at a meeting, except for dissolution of the Association, which must be voted on at a special meeting of the members entitled to vote.

ARTICLE VII: OFFICERS AND THE COUNCIL

SECTION 1. General Powers. The property, business and affairs of the Association shall be managed by the Council. The Council may adopt such rules and regulations for the conduct of its business as shall be deemed advisable and may, in the execution of the power granted, appoint such agents as necessary. In addition, the Council shall act as a Board of Censors for the trial of all alleged offenses against the bylaws. A report by the Chair of the Council shall be made to the members at the annual meeting.

SECTION 2. Number, Tenure and Qualifications. The Council shall consist of the Past President, the Chair of the Council (Immediate Past President), the President, the President-Elect, the Vice President, the Secretary/Treasurer, the Director of Continuing Medical Education, the Historian and three Councilors-at-Large. The representative of the Board of Governors of the American College of Surgeons, representative of the Advisory Council for Cardiothoracic Surgery of the American College of Surgeons, the Editor of the Annals of Thoracic Surgery, the Chair of the Program Committee, the Chair of the Membership Committee, the Chair of the Postgraduate Program Committee, and the Chair of the Finance Committee shall attend the Council meetings without vote.

SECTION 3. Election. The eligible members will elect the Council. Officers shall be elected annually to serve a one-year term, except the Secretary/Treasurer whose term shall be for four years and the historian whose term shall be for four years and who can be re-elected. The President, Vice President and Secretary/Treasurer are not eligible for re-election. The term of office of councilors-at-large shall be two years. Two Councilors shall be elected one-year and one Councilor the next year to replace the retiring members, unless a vacancy or vacancies has occurred, in which case an additional Councilor(s) shall be appointed by the President to fill the vacant term(s).

SECTION 4. Resignation. Any Council member may resign at any time by giving written notice to the President. Such resignation shall take effect when the notice is delivered, unless the notice specifies a future date. Another exception would be, unless otherwise specified therein, the acceptance of such resignation shall not be necessary to make it effective.

SECTION 5. Annual Meetings. The annual meeting of the Council shall be held at the time and place designated by the Council in connection with the annual members meeting.

SECTION 6. Regular Meetings. The Council may hold regular meetings at such place and at such times as designated by the Council.

SECTION 7. Special Meetings. Special meetings of the Council may be held at any place and time on the call of the President or at the request in writing of any three Council members.

SECTION 8. Notice of Meetings. Notice of special meetings of the Council shall be delivered by, or at the direction of, the Secretary/Treasurer to each Council member at least seven (7) days before the day on which the meeting is to be held. Notice may be waived in writing by a Council member, either before or after the meeting. Neither the business to be transacted at, nor the purpose of any special meeting of the Council, need be specified in the notice or waiver of notice of such meeting.

SECTION 9. Quorum. A majority of the Council members entitled to vote shall constitute a quorum for the transaction of business at any meeting of the Council.

SECTION 10. Manner of Acting. The act of a majority of the Council members at a meeting at which a quorum is present shall be the act of the Council, unless the act of a greater number is required by law, the articles of incorporation, or by these bylaws.

SECTION 11. Informal Action. Action may be taken by the Council without a meeting if a consent in writing, setting forth the action so taken, is signed by all the Council members.

SECTION 12. Participation at Meetings by Conference Telephone. Members of the Council, or of any committee designated by the Council, may take any action permitted or authorized by these bylaws by means of conference telephone, or similar telecommunications equipment, in which all persons participating in the meeting can communicate with each other. Participation in such a meeting shall constitute presence in person at such meeting.

SECTION 13. Compensation. Council members, as such, shall not receive any stated compensation for their services on the Council, but the Council may, by resolution, authorize reimbursement for reasonable expenses incurred in the performance of their duties. The Council will occasionally review the reimbursement policies.

ARTICLE VIII: OFFICERS AND EXECUTIVE DIRECTOR

SECTION 1. Officers. The officers of the Association shall consist of the President, the President-Elect, the Vice President, the Secretary/Treasurer, the Chair (Immediate Past President), the Past President, the Historian, and such other officers and assistant officers as may be elected in accordance with the provisions of this Article. The Council may elect or appoint such other officers as it shall deem necessary. These officers shall have the authority to perform such duties as may be prescribed from time-to-time by the Council.

SECTION 2. President. The President shall be the principal elected officer of the Association. The President shall preside at all meetings of the Association. The President shall appoint members to the standing committees and to any other special committee, which may be deemed necessary for the welfare of the association. The President shall perform all other duties appropriate to the conduct of the office. At the conclusion of the annual meeting, the retiring President shall automatically become a Councilor for a two-year term of office in the capacity of Chair the first year and Past President the second year.

SECTION 3. President-Elect. The President-Elect shall participate in all the meetings and deliberations of the Council during the year elected and shall accede to the office of President the following year.

SECTION 4. Vice President. In the absence of the President, or in the event of his or her inability or refusal to act, the Vice President shall perform the duties of the President. When so acting, the Vice-President shall have all the powers, and be subject to all the restrictions, of the President. The Vice President shall perform such other duties as may be assigned by the President or by the Council.

SECTION 5. Secretary/Treasurer. As Secretary he/she shall: keep the minutes of the meetings of the members and of the Council in one or more books provided for that purpose; see that all notices are duly given in accordance with the provisions of these bylaws, or as required by law; be custodian of the Council's records; keep a register of the post office address of each member, which shall be furnished to the Secretary by such member; notify candidates of their election to membership; and in general perform all duties incident to the office of Secretary, and such other duties that may be assigned by the President or by the Council. The administrative duties of the Secretary may be assigned, in whole or in part, to the Executive Director by the Council.

As Treasurer, he/she shall keep an account of all monies received and expended by the Association and shall make disbursements authorized by the Council. All sums received shall be deposited or invested in such bank, trust company, or other depositories authorized by the Council. The Treasurer shall perform all the duties incident to the office of Treasurer and such other duties as may be assigned by the President or by the Council. The administrative duties of the Treasurer may be assigned, in whole or in part by the Council, to the Executive Director. He/she shall present an annual report to the membership for audit.

SECTION 6. Secretary/Treasurer-Elect. The Secretary/Treasurer-Elect shall serve as understudy to the Secretary/Treasurer for a term of one year.

SECTION 7. Chair. The immediate Past President shall be the Chair of the Council and perform such duties as occasionally may be designated by the President or by the Council. Upon termination of the term of office as President, the President shall become Immediate Past President for a one-year term.

SECTION 8. Past President. The Past President shall serve on the Council and perform such duties as may be designated by the President, Chair of the Council, or by the Council. Upon termination of the term of office as Immediate Past President, the Immediate Past President shall become Previous Past President for a one year term.

SECTION 9. Director of Continuing Medical Education. The Director of Continuing Medical Education shall be appointed by the President for a term of four years and shall oversee and coordinate the Program and Postgraduate Programs, and the administration aspects of continuing education, and chair the Continuing Education Committee.

SECTION 10. Executive Director. The administrative duties and day-to-day operation of the Association shall be conducted by a salaried staff head or firm employed or appointed by the Council. The Executive Director shall be responsible to the Council. The Executive Director shall have the authority to execute contracts on behalf of the Association and as approved by the Council. The Executive Director may carry out the duties of the Secretary of the Association and may carry out the duties of the Treasurer as directed by the Council. The Executive Director shall employ and may terminate the employment of staff members necessary to carry out the work of the Association and shall perform such other duties as may be specified by the Council.

SECTION 11. Historian. The Historian shall record the history of the Association, keep archives of the programs and minutes of the Business and Council meetings, and report the deaths of members at the annual business meeting. In addition, he/she shall perform all other duties appropriate to this office and other duties assigned by the President for Council.

ARTICLE IX: COMMITTEES

The President shall appoint committees as may be necessary for the proper conduct and management of the Association. The standing Committees of the Association shall be:

SECTION 1. Executive Committee. The Executive Committee shall consist of the officers of the Association and the Executive Director. The Executive Director shall be ex-officio, a member of the Executive Committee without the right to vote. The Executive Committee may exercise the authority of the Council in the management of the affairs of the Association during the intervals between meetings of the Council, subject at all times to the bylaws of the Association, and the prior resolutions, regulations and directives issued, adopted or promulgated by the Council. A majority of the members of the Executive Committee shall constitute a quorum for the transaction of business. Meetings may be called by the President or by any two Executive Committee members.

SECTION 2. Program Committee. The Program Committee shall consist of the President, the Director of Continuing Medical Education, the Secretary/Treasurer, the Council Chair, and additional members appointed to the Program Committee. Appointment to the Program Committee shall be for a period of three years. Appointment(s) to this committee shall be made by the President each year. The senior members of the appointed members shall serve as Co-Chairs. It shall be the duty of the committee to review the abstracts of scientific papers submitted by the members and arrange the program for the annual meeting. Seventy-five percent or more of abstracts presented during the regular scientific program the STSA Annual Meeting should include a member of the association as an author.

SECTION 3. Postgraduate Program Committee. The Postgraduate Program Committee shall consist of the Director of Continuing Medical Education and appointed members. Appointments to the Postgraduate Program Committee shall be for a period of three years. Appointments to this committee shall be made by the President each year. The senior members of the appointed members of the committee shall serve as Co-Chairs. It shall be the duty of this committee to arrange a Postgraduate Continuing Medical Education Program to cover broad and varied aspects of thoracic surgery to be presented at the time of the annual meeting.

SECTION 4. Membership Committee. This committee shall consist of four members. Appointment to the Membership Committee shall be for a period of four years. One new appointee to this committee shall be made by the President each year. The senior member of the committee shall serve as Chair. This committee shall receive applications for membership in the association and after consideration of the applicants may propose them to the Council for approval and to the membership for election.

SECTION 5. Continuing Medical Education Committee. This committee shall consist of the Chair of the Postgraduate Committee, the Chair of the Program Committee, and the Director of Continuing Medical Education who shall serve as Chair. It shall be the duty of this committee to set up the objectives of the next annual meeting with the said objectives being presented for approval by the Council at their interim meeting and forwarded to members prior to the annual meeting.

SECTION 6. Nominating Committee. This committee shall consist of the four Immediate Past Presidents with the most senior Past President serving as Chair. This committee shall prepare a slate of nominees for officers and Councilors for the following year. This report is submitted to the organization at its annual meeting. The recommendations of the Nominating Committee are not intended to exclude direct nominations from the floor.

SECTION 7, Scholarship Committee. This committee shall consist of five members. Appointment to the Scholarship Committee shall be for a period of four years. One new appointee to this committee shall be made by the President each year. The senior member of the committee shall serve as Chair. This committee shall receive applications for all STSA sponsored scholarship programs and after consideration of the applicants may propose scholarship recipients and finalists to the Council for approval.

CONSTITUTION AND BYLAWS

SECTION 8: Finance Committee. The Finance Committee shall consist of the President-Elect, President, Secretary/Treasurer, Past-President and three (3) members appointed by the Council. The Chair will be appointed by the Executive Committee and will not be a current member of that committee. Each appointed member shall serve for a three-year term, beginning at the time of appointment; provided that the terms of the members appointed by the Council effective January 2018 shall be staggered in such a manner that the initial term of one-third of the appointed members will end at the conclusion of the 2018 STSA Annual Meeting; that the initial term of one-third of the appointed members will end at the conclusion of the 2019 STSA Annual Meeting; that the initial term of one-third of the appointed members term end at the conclusion of the 2020 STSA Annual Meeting. Each appointed member may serve a maximum of two full three-year terms. The Committee shall be responsible for the financial oversight of the Association ensuring its long term financial viability in accordance with the strategic plan established by the Council.

SECTION 9: Other Committees. Other committees may be designated by a resolution adopted by a majority of the Council present at a meeting at which a quorum is present (Ad Hoc Committees may be designated by the President with approval of the Council). Except as otherwise provided in such resolution, members of each committee shall be members of the Association, and the President of the Association shall appoint the members thereof. Any member may be removed by the person or persons authorized to appoint such member whenever in their judgment the best interests of the Association shall be served by such removal.

SECTION 10. Term of Office. Each member of a committee shall continue as such until the next annual meeting of the Council or until a successor is appointed, unless the committee is terminated, or the member is removed from the committee, ceases to qualify as a member, or the member resigns from the committee.

SECTION 11. Vacancies. Vacancies in the membership of any committee may be filled by appointments made in the same manner as provided in the case of the original appointments.

SECTION 12. Quorum. Unless otherwise provided in the resolution of the Council designating a committee, a majority of any committee shall constitute a quorum for committee action. The act of a majority of committee members present and voting at a meeting, at which a quorum is present, shall be the act of the committee.

SECTION 13. Participation at Meetings by Conference Telephone. Committee members may participate in and act at any committee meeting through the use of a conference telephone or other communications equipment by means of which all persons participating in the meeting can communicate with each other. If the Chair of a committee so orders, participation in such meetings shall constitute attendance at the meeting.

SECTION 14. Meetings of Committees. Subject to action by the Council, each committee by a majority vote of its members shall determine the time and place of meetings and the notice required.

SECTION 15. Informal Action. Any action required or taken at a meeting of a committee may be taken without a meeting if a consent in writing, setting forth the action so taken, is signed by all of the committee members.

SECTION 16. Rules. Each committee may adopt rules for its own government not inconsistent with these bylaws or with rules adopted by the Council.

ARTICLE X: OFFICIAL ORGAN

The Annals of Thoracic Surgery shall be the official publication of the Southern Thoracic Surgical Association. Papers read before the Association shall be forwarded to the Editor of *The Annals of Thoracic Surgery* for consideration for publication at the time requested by the Program Committee Chair and Editor of *The Annals*.

ARTICLE XI: CONTRACTS, CHECKS, DEPOSITS AND FUNDS, BONDING

SECTION 1. Contracts. The Council may authorize any officer or officers, agent or agents of the Association, in addition to the officers so authorized by these bylaws, to enter into any contract or execute and deliver any instrument in the name of, and on behalf of, the Association. Such authority may be general or confined to specific instances.

SECTION 2. Depositories. All funds of the Association not otherwise employed shall be deposited to the credit of the Association in such banks, trust companies or other depositories as the Council may designate.

SECTION 3. Checks, Drafts, Notes, Etc. All checks, drafts or other orders for the payment of money and all notes or other evidences of indebtedness issued in the name of the Association shall be signed by such officer or officers, or agent or agents, of the Association and in such manner as shall be determined by resolution of the Council.

SECTION 4. Bonding. The Council shall provide for the bonding of such officers and employees of the Association, as needed.

SECTION 5. Delivery of Notice. Any notices required to be delivered pursuant to these bylaws shall be deemed to be delivered when transferred or presented in person or deposited in the United States mail addressed to the person at his/her or its address as it appears on the records of the Association, with sufficient first-class postage prepaid thereon.

SECTION 6. Investments. Unless otherwise specified by the terms of a particular gift, bequest or devise, grant or other instrument, the funds of the Association may be invested, in such manner as the Council may deem advantageous, without regard to restrictions applicable to trusts or trust funds.

ARTICLE XII: BOOKS AND RECORDS

The Association shall keep correct and complete books and records of accounts and shall also keep minutes of the proceedings of its members, Council, and committees having any of the authority of the Council, and shall keep at the registered or principal office a record giving the names and addresses of the members entitled to vote. All books and records of the Association may be inspected by any member, or his or her agent or attorney, for any proper purpose at any reasonable time.

ARTICLE XIII: FISCAL YEAR

The fiscal year of the Association shall be established by the Council.

ARTICLE XIV: WAIVER OF NOTICE

Whenever any notice is required to be given under the provisions of the General Not For Profit Corporation Act of the State of Illinois or under the provisions of the articles of incorporation or the bylaws of the Association, a waiver in writing signed by the person or persons entitled to such notice, whether before or after the time stated therein, shall be deemed equivalent to the giving of such notice. Attendance at any meeting shall constitute waiver of notice unless the person at the meeting objects to the holding of the meeting because proper notice was not given.

ARTICLE XV: INDEMNIFICATION OF DIRECTORS, OFFICERS, EMPLOYEES AND AGENTS; INSURANCE

SECTION 1. Right to Indemnification. Each person who was or is a party or is threatened to be made a party to, or is involved in, any action, suit or proceeding—whether civil, criminal, administrative or investigative—by reason of the fact that he/she, or a person of whom he/she is the legal representative, is or was a director, officer, employee or agent of the Association, or is or was serving at the request of the Association, shall be indemnified and held harmless by the Association to the fullest extent authorized by the laws of Illinois against all costs, charges, expenses, liabilities and losses reasonably incurred or suffered by such person in connection with and such indemnification shall continue to a person who has ceased to be associated with the Association. This includes attorneys' fees, judgments, fines, ERISA excise taxes or penalties and amounts paid, or to be paid, in settlement. The right to indemnification conferred in this Article XV shall be a contract right and shall include the right to be paid by the Association the expenses incurred in defending any such proceeding in advance of its final disposition. For the purpose of determining the reasonableness of indemnifiable expenses, the fees and expenses of separate counsel from counsel for the Association, or other joint defendants being indemnified by the Association, shall not be indemnifiable unless there exists a bonafide conflict of interest.

SECTION 2. Right of Claimant to Bring Suit. If a claim under Section 1 of Article XV is not paid in full by the Association within a reasonable amount of time after a written claim has been received by the Association, the claimant may at any time thereafter bring suit against the Association to recover the unpaid amount of the claim and, if successful in whole or in part, the claimant shall also be entitled to be paid the expenses of prosecuting such a claim. It shall be a defense to any action that the claimant has failed to meet a standard of conduct which makes it permissible under Illinois law for the Association to indemnify the claimant for the amount claimed. But the burden of proving such defense shall be on the Association.

SECTION 3. Non-Exclusive of Rights. The right to indemnification and the payment of expenses incurred in defending a proceeding in advance of its final disposition conferred in Article XV shall not be exclusive of any other right which any person may have or hereafter acquire under any statute, provision of the articles of incorporation, bylaws, agreement, vote of members or disinterested directors or otherwise.

SECTION 4. Insurance. The Association shall maintain insurance to the extent of availability at commercial reasonable rates, at its expense, to protect itself and any director, officer, employee or agent of the Association or another corporation, partnership, joint venture, trust or other enterprise against any expense, liability or loss, whether or not the Association would have the power to indemnify such person against such expense, liability or loss under Illinois law.

SECTION 5. Expenses as a Witness. To the extent that any director, officer, employee or agent of the Association is by reason of such position, or a position with another entity at the request of the Association, a witness in any proceeding, he shall be indemnified against all costs and expenses actually and reasonably incurred by him or on his behalf in connection therewith.

SECTION 6. Notification. If the Association has paid indemnity or has advanced expenses under this Article XV to a director, officer, employee or agent, the Association shall report the indemnification or advance in writing to the members with or before the notice of the next meeting of the members.

SECTION 7. Effect of Amendment. Any amendment, repeal or modification of any provision of this Article XV by the members or the directors of the Association shall not adversely affect any right or protection of a director or officer of the Association existing at the time of such amendment, repeal or modification.

ARTICLE XVI: DISSOLUTION

Upon the dissolution of the Association, and after payment of all indebtedness of the Association, any remaining funds, investments and other assets of the Association shall be distributed to such organization or organizations which are then qualified as exempt from taxation under Section 501(c) 6 of the Internal Revenue Code of 1986, as amended (or the corresponding provision of any future Internal Revenue Law of the United States). This distribution shall only occur if the purposes and objectives of such organization(s) are similar to the purposes and objectives of the Association, as may be determined by vote of the then voting members of the Association.

ARTICLE XVII: AMENDMENTS

These bylaws may be altered, amended, or repealed at the time of the annual meeting by a two-thirds vote of the membership present, provided that the amendment has been presented to the membership in writing at least 30 days prior to the time of the annual meeting.

ARTICLE XVIII: PARLIAMENTARY AUTHORITY

The deliberations of the Association, Council, and committees shall be governed by the parliamentary rules and usages contained in the then current edition of "Roberts Rules of Order, Newly Revised", when not in conflict with the bylaws of the Association.

RELATIONSHIP DISCLOSURE INDEX

COMMERCIAL RELATIONSHIPS OF STSA PROGRAM PLANNERS

STSA would like to thank the following STSA leaders for planning the educational content of the STSA 65th Annual Meeting. Unless otherwise noted, these STSA leaders have no relevant commercial relationships to disclose.

Commercial Relationships of STSA 65th Annual Meeting Program Planners
K.D. Accola: Speakers Bureau/Honoraria: Edwards Lifesciences; **G. Ailawadi:** Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic; **D.L. Miller:** Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic; **S.A. LeMaire:** Consultant/Advisory Board: Biom'up; Other Research Support: CytoSorbents, W.L. Gore & Associates, Terumo Aortic; **O. Preventza:** Consultant/Advisory Board: Medtronic, W.L. Gore & Associates

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Faisal G. Bakaeen: *Program Committee Co-Chair*
Elizabeth A. David: *Program Committee Co-Chair*
Kirk R. Kanter: *Postgraduate Committee Co-Chair*
DDaniel L. Miller: *Program Committee, Postgraduate Committee Co-Chair*
DGorav Ailawadi: *Postgraduate Committee*
Matthew J. Bott: *Postgraduate Committee*
Harold M. Burkhart: *Program Committee*
Joseph A. Dearani: *Program Committee*
Richard K. Freeman: *Program Committee*
David R. Jones: *Program Committee*
Ahmet Kilic: *Postgraduate Committee*
DScott A. LeMaire: *Program Committee, CME Committee Director*
Daniela Molena: *Program Committee*
DOurania Preventza: *Program Committee*
Todd K. Rosengart: *Postgraduate Committee*
Chad L. Stasik: *Postgraduate Committee*

COMMERCIAL RELATIONSHIPS OF STSA OFFICERS, COUNCIL, AND COMMITTEE MEMBERS

STSA would like to thank the following leaders for supporting the STSA 65th Annual Meeting as a member of the STSA Council and/or other STSA Committee. Unless otherwise noted, the STSA Officers, Council and Committee Members have no relevant commercial relationships.

Commercial Relationships of STSA Officers, Council and Committee Members
K.D. Accola: Speakers Bureau/Honoraria: Edwards Lifesciences; **G. Ailawadi:** Consultant/Advisory Board: Abbott Vascular, Cephea, Edwards Lifesciences, Medtronic; **S.H. Blackmon:** Ownership Interest: Boston Scientific; Research Grant: Medtronic, truFreeze; Speakers Bureau/Honoraria: Ethicon, Medtronic, Olympus; **M.E. Halkos:** Consultant/Advisory Board: Medtronic; **M.P. Kim:** Consultant/Advisory Board: Intuitive Surgical, Medtronic; Speakers Bureau/Honoraria: Boston Scientific, Olympus; **S.A. LeMaire:** Consultant/Advisory Board: Biom'up; Other Research Support: CytoSorbents, W.L. Gore & Associates, Terumo Aortic; **M.B. Marshall:** Consultant/Advisory Board: Ethicon, Medtronic; **D.L. Miller:** Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic; **O. Preventza:** Consultant/Advisory Board: Medtronic, W.L. Gore & Associates

RELATIONSHIP DISCLOSURE INDEX

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Elizabeth A. David (Co-Chair)
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Harold M. Burkhart
Joseph A. Dearani
Richard K. Freeman
DScott A. LeMaire
DDaniel L. Miller
Daniela Molena
DOurania Preventza

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Andrew J. Lodge
W. Brent Keeling

Postgraduate Committee
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DDaniel L. Miller (Co-Chair)
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Chad L. Stasik

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Elizabeth A. David
Kirk R. Kanter
DDaniel L. Miller

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Joseph B. Zwischenberger

Representative to the Advisory Council for Cardiothoracic Surgery for the American College of Surgeons
Stephen C. Yang

Nominating Committee
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Brooks Scholarship Committee
DMichael E. Halkos (Chair)
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Anthony D. Cassano
DMin Kim
Jennifer S. Nelson

The Annals of Thoracic Surgery Editor
G. Alexander Patterson

RELATIONSHIP DISCLOSURE INDEX

COMMERCIAL RELATIONSHIPS OF ABSTRACT REVIEWERS

STSA would like to thank the following leaders for reviewing the abstracts submitted for consideration for presentation at the STSA 65th Annual Meeting. Unless otherwise noted, the abstract reviewers have no relevant commercial relationships.

Commercial Relationships of STSA 65th Annual Meeting Abstract Reviewers
K.D. Accola: Speakers Bureau/Honoraria: Edwards Lifesciences; **E.P. Chen:** Speakers Bureau/Honoraria: Cryolife; **J.R. Edgerton:** Speakers Bureau/Honoraria: AtriCure; **T. Kaneko:** Speakers Bureau/Honoraria: Abbott, Edwards Lifesciences, Medtronic; **M.P. Kim:** Consultant/Advisory Board: Intuitive Surgical, Medtronic; Speakers Bureau/Honoraria: Boston Scientific, Olympus; **S.A. LeMaire:** Consultant/Advisory Board: Biom'up; Other Research Support: CytoSorbents, W.L. Gore & Associates, Terumo Aortic; **D.L. Miller:** Consultant/Advisory Board: Ethicon, Pacira Pharmaceuticals; Speakers Bureau/Honoraria: Acute Innovations, Medtronic; **O. Preventza:** Consultant/Advisory Board: Medtronic, W.L. Gore & Associates; **V.H. Thourani:** Consultant/Advisory Board: Abbott Vascular, Boston Scientific, Claret Medical, Cryolife, Edwards Lifesciences, Gore Vascular, Jena Valve; **G.H. Wheatley, III:** Consultant/Advisory Board: Bolton Medical, Ethicon, Medtronic

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COMMERCIAL RELATIONSHIPS OF STSA STAFF

Unless otherwise noted, staff members have no relevant commercial relationships.

Beth Winer: *Executive Director*
Laura Medek: *Affiliate Manager*
Rachel Pebworth: *Affiliate Manager*
Maricruz Carreno: *Affiliate Organizations Coordinator*

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